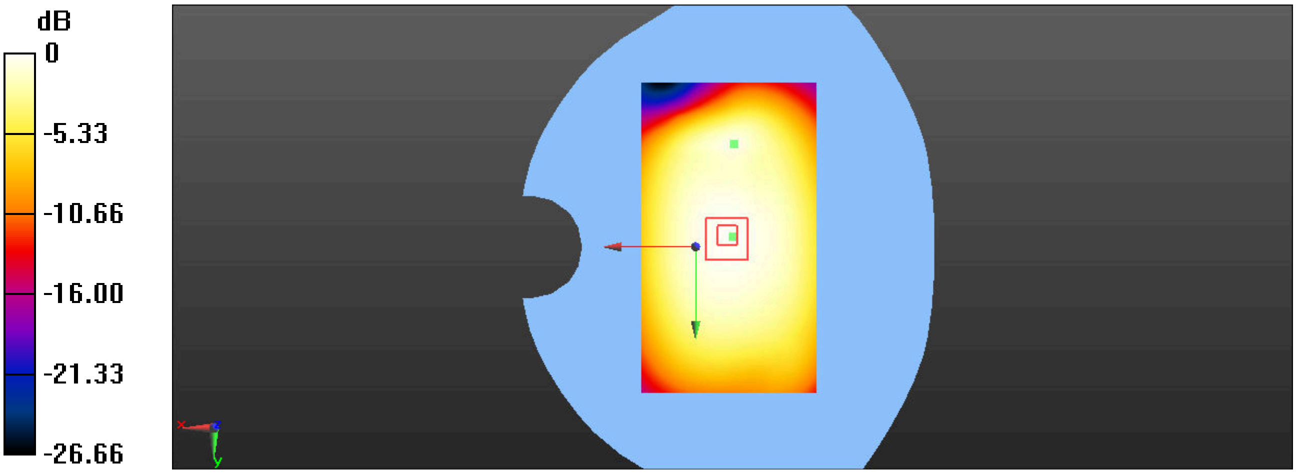
| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_1RB_low) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 836.5 MHz; $\sigma$ = 0.95 S/m; $\varepsilon_r$ = 54.245; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.08, 6.08, 6.08); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/towards ground/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.427 W/kg
**body/towards ground/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.49 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.494 W/kg
**SAR(1 g) = 0.386 W/kg; SAR(10 g) = 0.294 W/kg**
Maximum value of SAR (measured) = 0.427 W/kg




0 dB = 0.427 W/kg = -3.70 dBW/kg

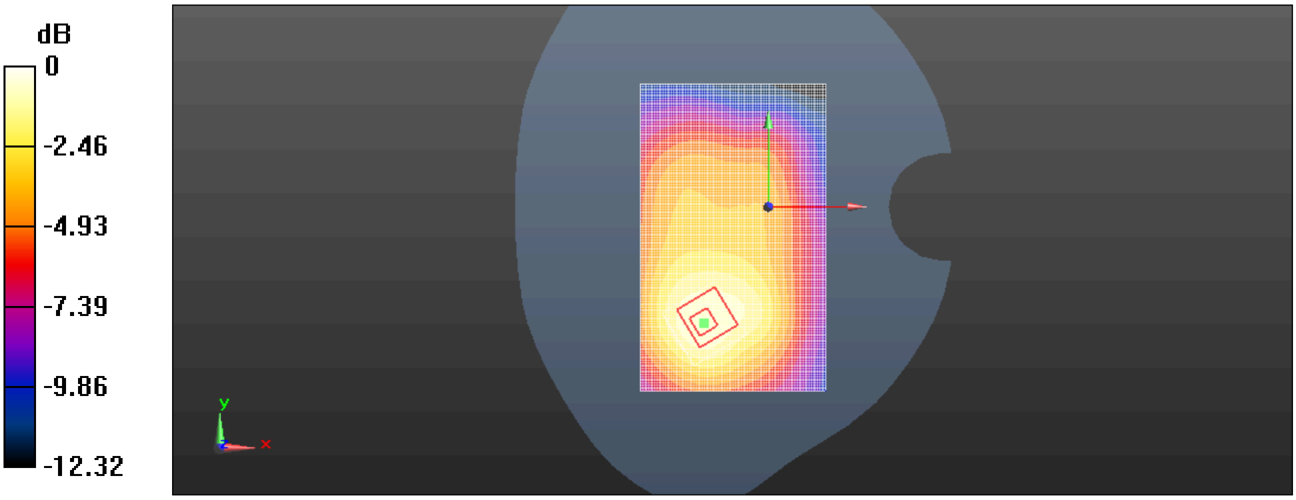
| FLAT | EDGE2 |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_1RB_low) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 836.5 MHz; $\sigma$ = 0.95 S/m; $\varepsilon_r$ = 54.245; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.08, 6.08, 6.08); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/edge 2 mid/Area Scan (61x101x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0759 W/kg
**body/edge 2 mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.374 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.126 W/kg
**SAR(1 g) = 0.0639 W/kg; SAR(10 g) = 0.0397 W/kg**

Maximum value of SAR (measured) = 0.0742 W/kg




0 dB = 0.0759 W/kg = -11.20 dBW/kg

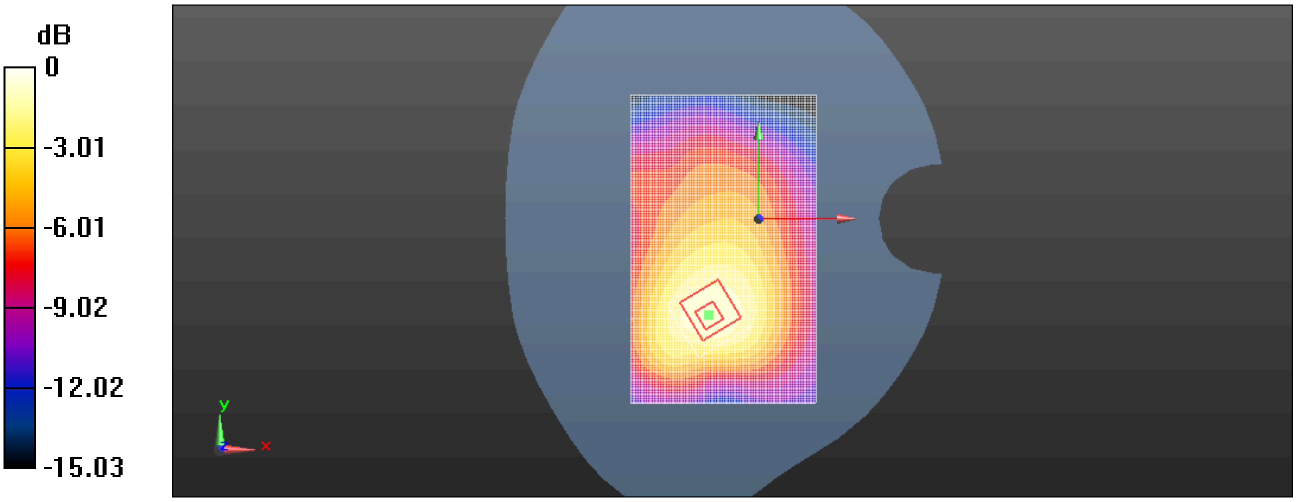
| FLAT | EDGE3 |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_1RB_low) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 836.5 MHz; $\sigma = 0.95$ S/m; $\varepsilon_r = 54.245$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.08, 6.08, 6.08); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body2/edge3 mid/Area Scan (61x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm.
Maximum value of SAR (interpolated) = 0.167 W/kg
**body2/edge3 mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.52 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 0.213 W/kg
**SAR(1 g) = 0.146 W/kg; SAR(10 g) = 0.0989 W/kg**

Maximum value of SAR (measured) = 0.165 W/kg



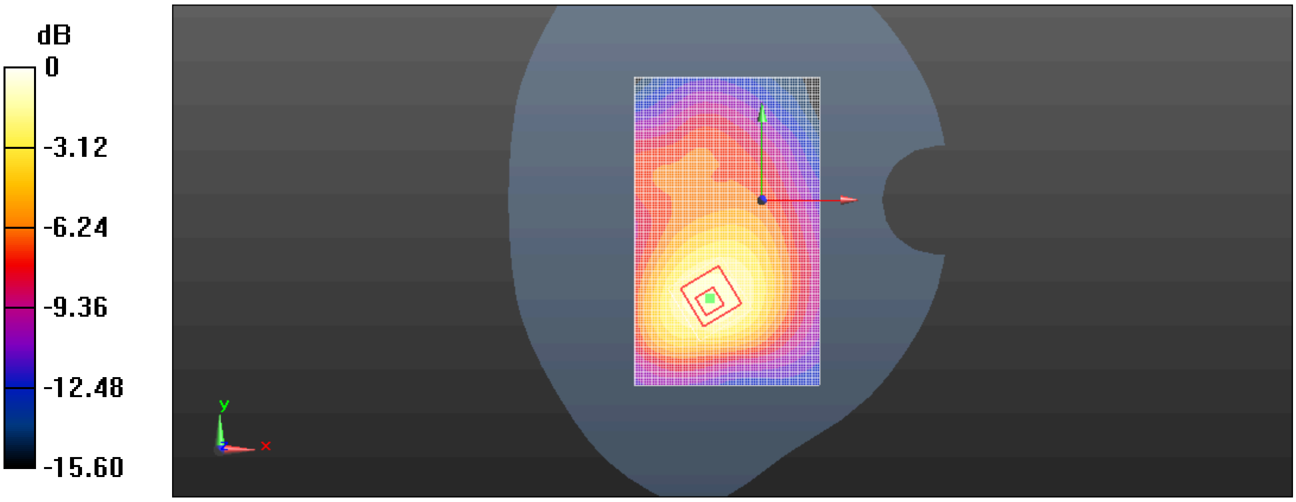

0 dB = 0.167 W/kg = -7.77 dBW/kg

| FLAT | EDGE4 |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_1RB_low) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 836.5 MHz; $\sigma = 0.95$ S/m; $\varepsilon_r = 54.245$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.08, 6.08, 6.08); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body2/edge4 mid/Area Scan (61x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.263 W/kg
**body2/edge4 mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.01 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.465 W/kg
**SAR(1 g) = 0.229 W/kg; SAR(10 g) = 0.155 W/kg**
Maximum value of SAR (measured) = 0.261 W/kg



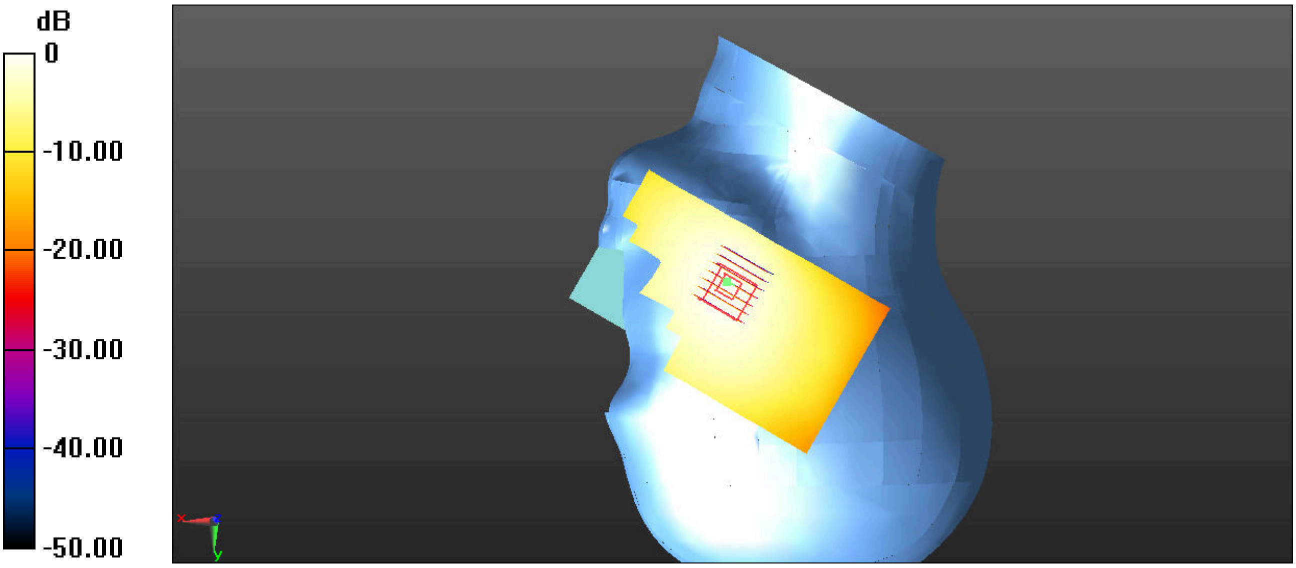

0 dB = 0.263 W/kg = -5.80 dBW/kg

**LTE (Band 5 10BW-50%RB-Low /Head)**

| Left Side | Cheek |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_25RB) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used : f = 836.5 MHz; $\sigma = 0.883$ S/m; $\varepsilon_r = 41.293$; $\rho = 1000$ kg/m$^3$
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.18, 6.18, 6.18); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
- **left/touch mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR = 0.165 W/kg
  **left/touch mid 50%RB/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 4.952 V/m; Power Drift = -0.16 dB
  Peak SAR (extrapolated) = 0.197 W/kg
  **SAR(1 g) = 0.151 W/kg; SAR(10 g) = 0.114 W/kg**
  Maximum value of SAR (measured) = 0.168 W/kg




0 dB = 0.165 W/kg = -7.83 dBW/kg

| Left Side | Tilt |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_25RB) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used : f = 836.5 MHz; σ = 0.883 S/m; $\varepsilon_r$ = 41.293; ρ = 1000 kg/m$^3$
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

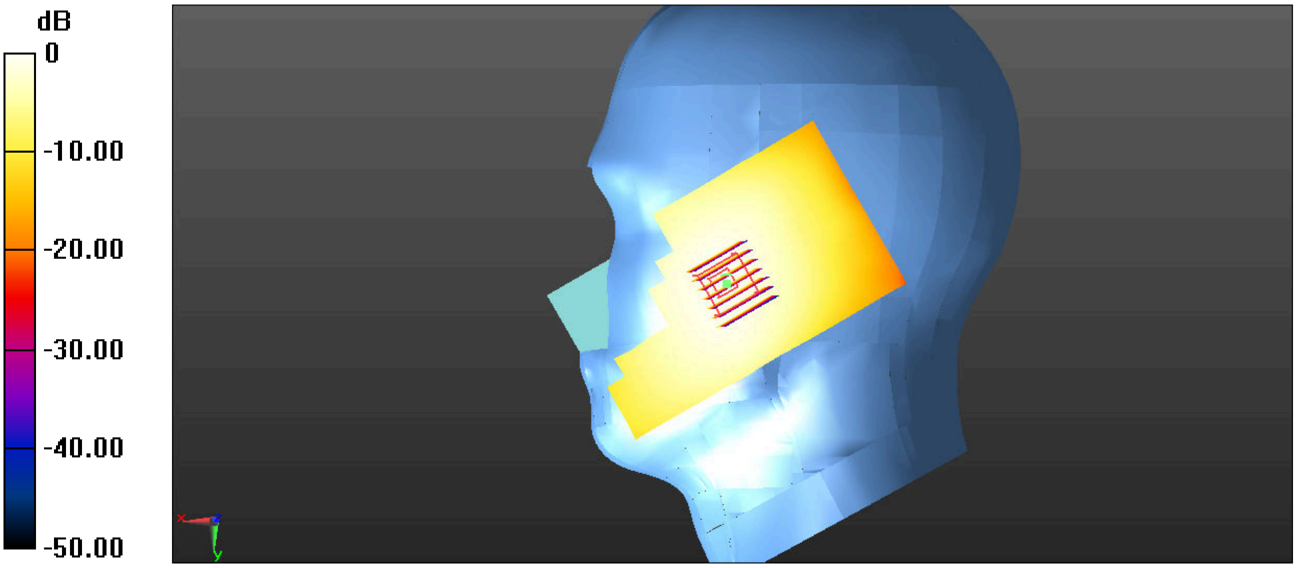
- Probe: ES3DV3 - SN3297; ConvF(6.18, 6.18, 6.18); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
- **left/tilt mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR = 0.0705 W/kg
  **left/tilt mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 6.947 V/m; Power Drift = 0.10 dB
  Peak SAR (extrapolated) = 0.101 W/kg
  **SAR(1 g) = 0.0615 W/kg; SAR(10 g) = 0.0431 W/kg**
  Maximum value of SAR (measured) = 0.0699 W/kg


0 dB = 0.0705 W/kg = -11.52 dBW/kg

| Right Side | Cheek |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_25RB) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used : f = 836.5 MHz; $\sigma$ = 0.883 S/m; $\varepsilon_r$ = 41.293; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.18, 6.18, 6.18); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
- **right/touch mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR = 0.150 W/kg
  **right/touch mid 50%RB/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 4.696 V/m; Power Drift = 0.18 dB
  Peak SAR (extrapolated) = 0.169 W/kg
  **SAR(1 g) = 0.136 W/kg; SAR(10 g) = 0.105 W/kg**
  Maximum value of SAR (measured) = 0.149 W/kg




0 dB = 0.150 W/kg = -8.24 dBW/kg

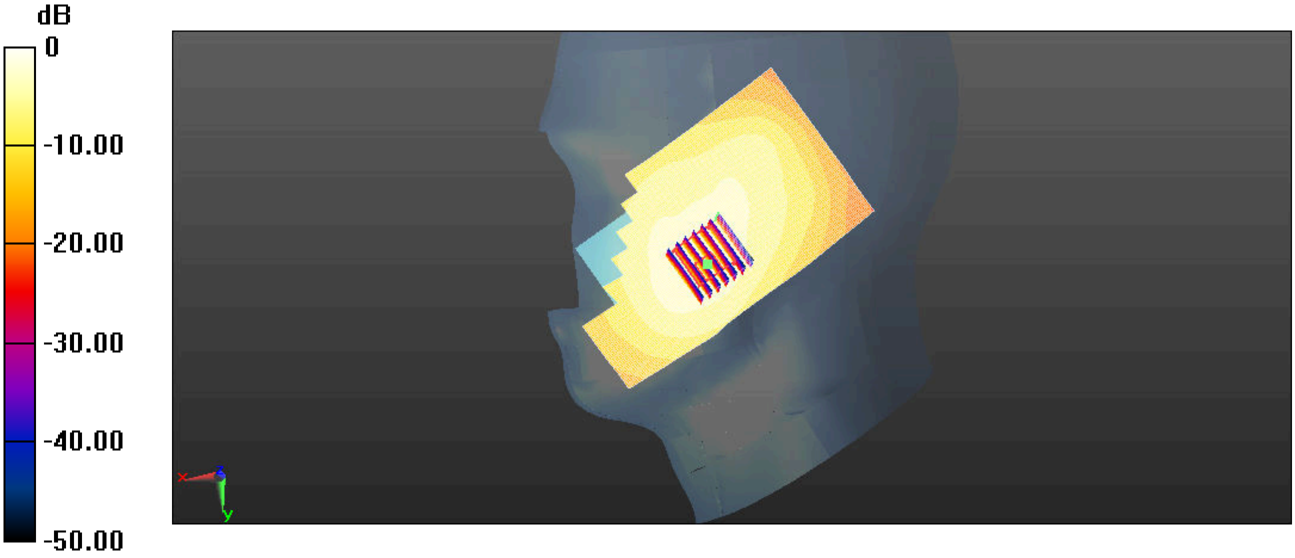
| Right Side | Tilt |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_25RB) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used : f = 836.5 MHz; σ = 0.883 S/m; $\varepsilon_r$ = 41.293; ρ = 1000 kg/m$^3$
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.18, 6.18, 6.18); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **right/tilt mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR = 0.0823 W/kg
  **right/tilt mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 7.355 V/m; Power Drift = 0.06 dB
  Peak SAR (extrapolated) = 0.104 W/kg
  **SAR(1 g) = 0.0721 W/kg; SAR(10 g) = 0.0501 W/kg**

Maximum value of SAR (measured) = 0.0819 W/kg




0 dB = 0.0823 W/kg = -10.85 dBW/kg

**LTE (Band 5 10BW-50%RB-Low/Flat)**

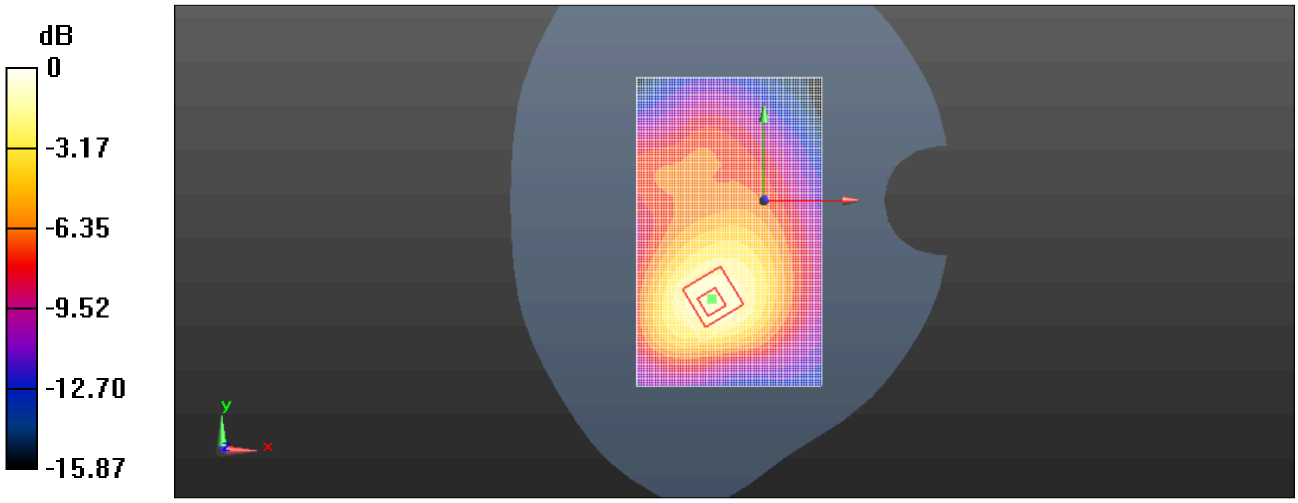
| FLAT | Towards phantom |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_25RB) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.95 S/m; $\varepsilon_r$ = 54.245; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.08, 6.08, 6.08); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/towards phantom 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.166 W/kg
**body/towards phantom 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.77 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.297 W/kg
**SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.105 W/kg**

Maximum value of SAR (measured) = 0.165 W/kg



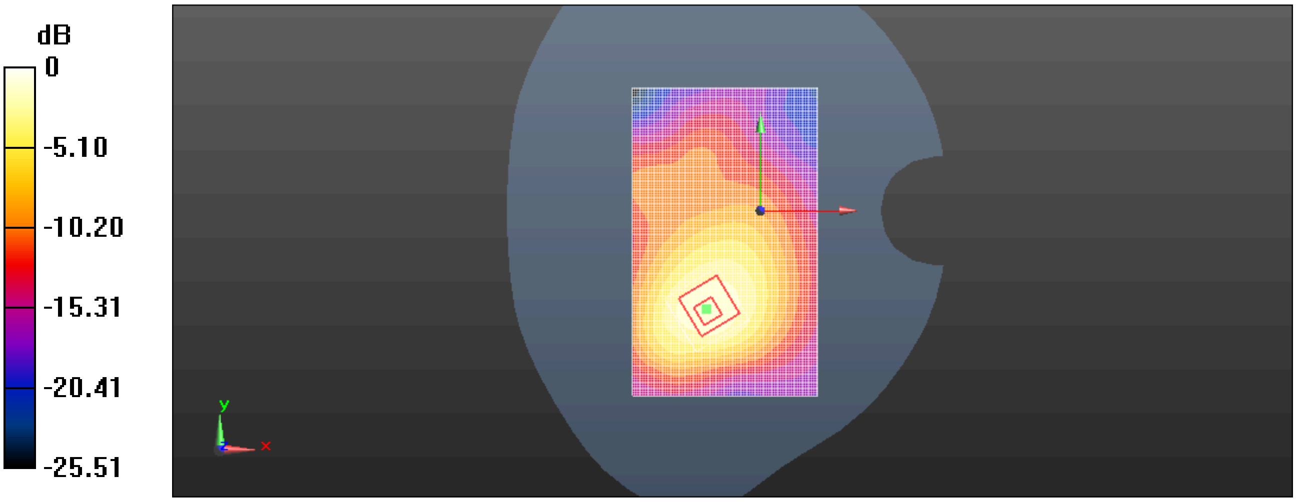

0 dB = 0.166 W/kg = -7.80 dBW/kg

| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_10M_25RB) (0); Communication System Band: BAND 5; Frequency: 836.5 MHz;Communication System PAR: 0 dB
Medium parameters used (interpolated): f = 836.5 MHz; $\sigma = 0.95$ S/m; $\varepsilon_r = 54.245$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: ES3DV3 - SN3297; ConvF(6.08, 6.08, 6.08); Calibrated: 14/10/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 28/09/2016
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/towards ground 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.339 W/kg
**body/towards ground 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.46 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.465 W/kg
**SAR(1 g) = 0.299W/kg; SAR(10 g) = 0.212 W/kg**.
Maximum value of SAR (measured) = 0.337 W/kg




0 dB = 0.339 W/kg = -4.70 dBW/kg

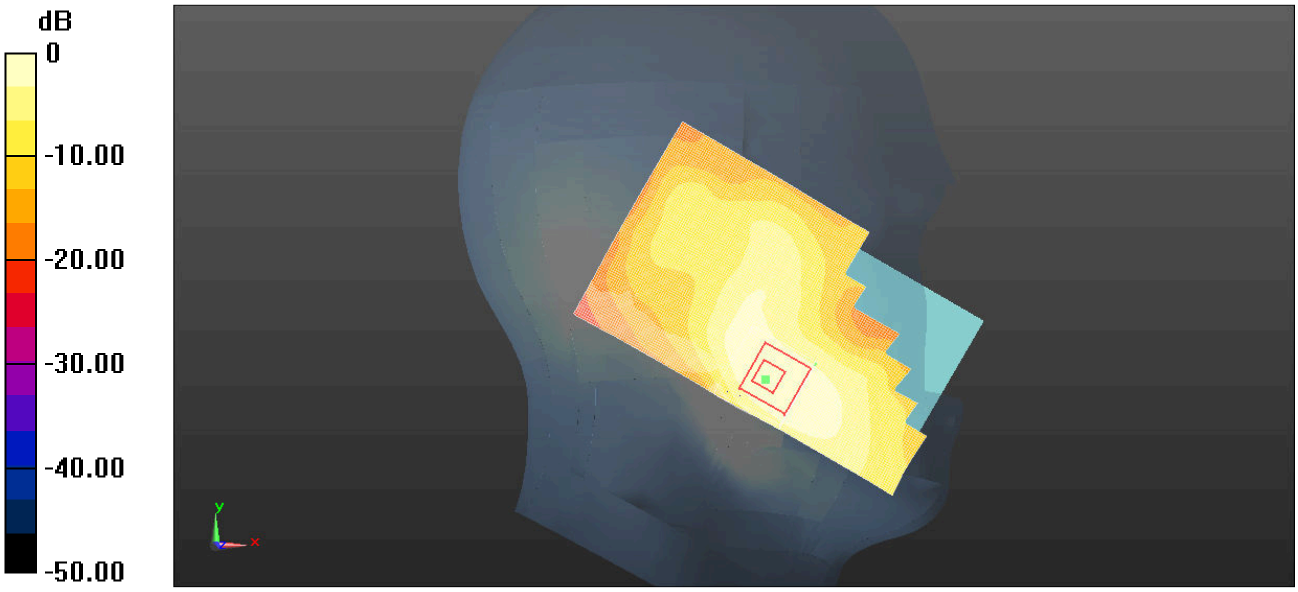
**LTE (Band 7 20BW-1RB-Low /Head)**

| Left Side | Cheek |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**left/touch mid/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.363 W/kg
**left/touch mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.337 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.427 W/kg
**SAR(1 g) = 0.229 W/kg; SAR(10 g) = 0.124 W/kg**
Maximum value of SAR (measured) = 0.358 W/kg




0 dB = 0.363 W/kg = -4.40 dBW/kg

| Left Side | Tilt |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**left/tilt mid/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.202 W/kg
**left/tilt mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.480 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.222 W/kg
**SAR(1 g) = 0.118 W/kg; SAR(10 g) = 0.058 W/kg**
Maximum value of SAR (measured) = 0.180 W/kg

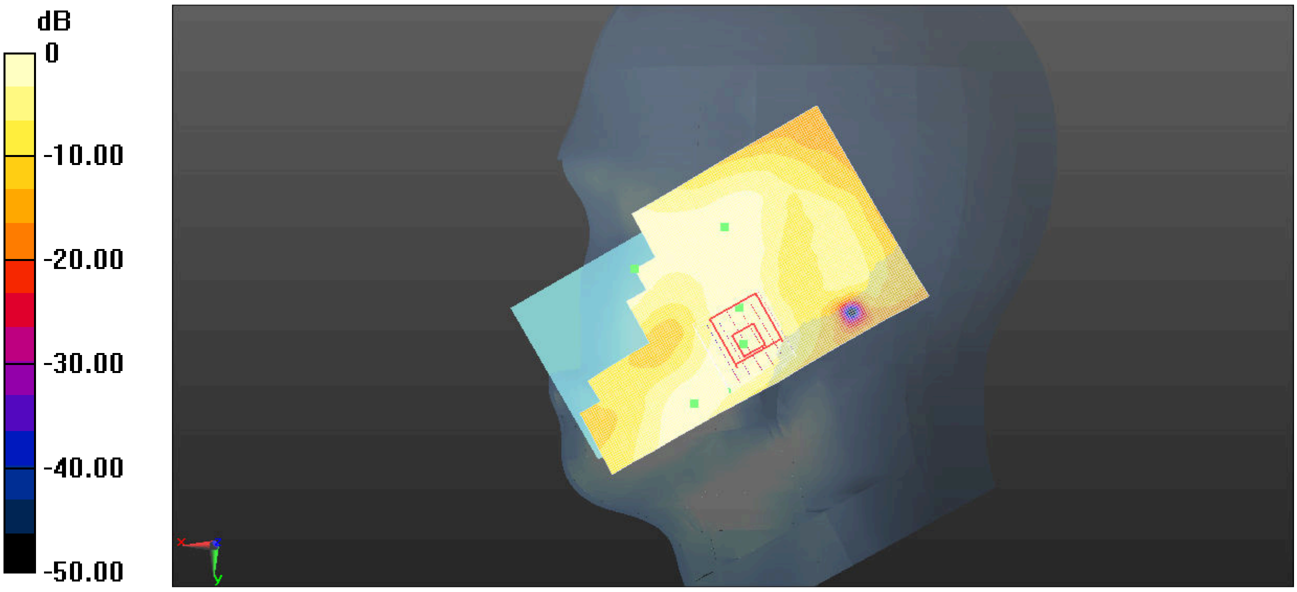

0 dB = 0.202 W/kg = -6.95 dBW/kg

| Right Side | Cheek |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**right/touch mid/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.151 W/kg
**right/touch mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.708 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.181 W/kg
**SAR(1 g) = 0.104 W/kg; SAR(10 g) = 0.057 W/kg**
Maximum value of SAR (measured) = 0.154 W/kg



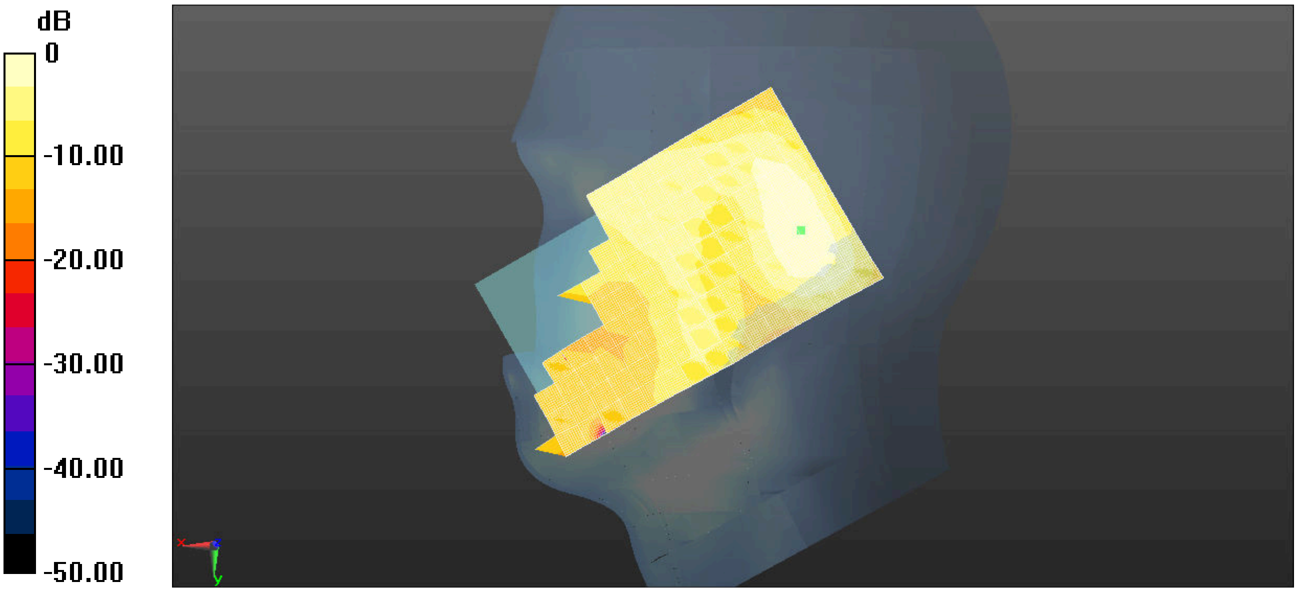

0 dB = 0.151 W/kg = -8.22 dBW/kg

| Right Side | Tilt |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma = 1.961$ S/m; $\varepsilon_r = 39.2$; $\rho = 1000$ kg/m$^3$
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **right/tilt mid/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.129 W/kg
  **right/tilt mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

- Reference Value = 7.108 V/m; Power Drift = 0.03 dB
  Peak SAR (extrapolated) = 0.281 W/kg
  **SAR(1 g) = 0.0826 W/kg; SAR(10 g) = 0.0430 W/kg**
  Maximum value of SAR (measured) = 0.128 W/kg



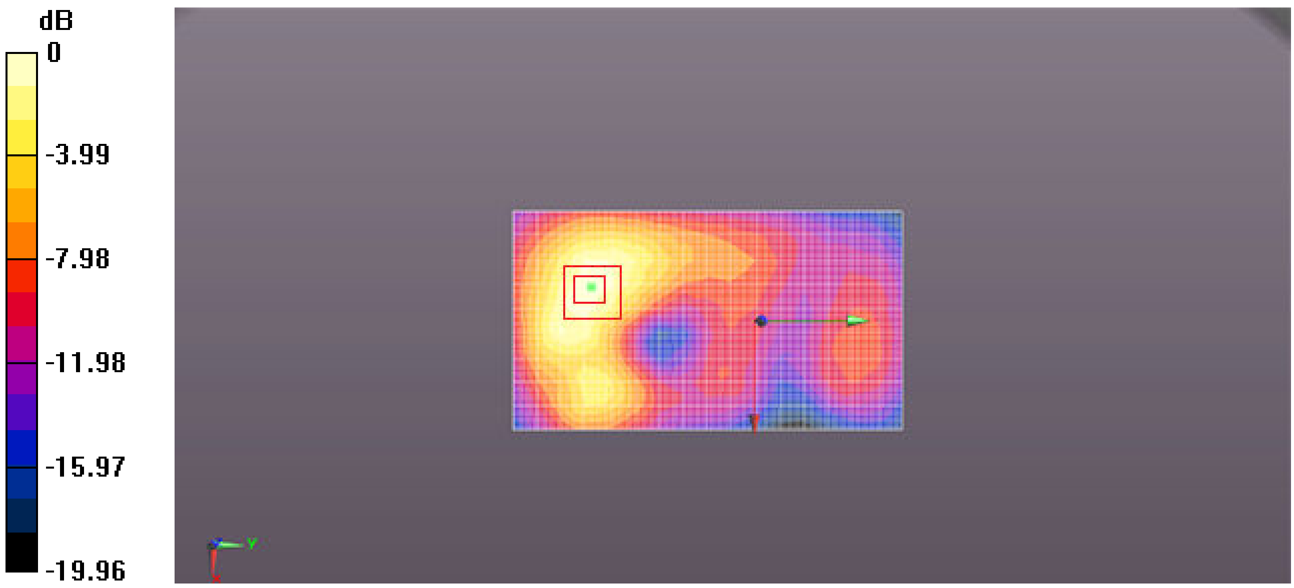

0 dB = 0.129 W/kg = -8.89 dBW/kg

**LTE (Band 7 20BW-1RB-Low/Flat)**

| FLAT | Towards phantom |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; σ = 2.135 S/m; $\varepsilon_r$ = 51.45; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **body/towards phantom mid/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.724 W/kg
  **body/towards phantom mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 5.554 V/m; Power Drift = -0.03 dB
  Peak SAR (extrapolated) = 0.881 W/kg
  **SAR(1 g) = 0.465 W/kg; SAR(10 g) = 0.242 W/kg**
  Maximum value of SAR (measured) = 0.715 W/kg



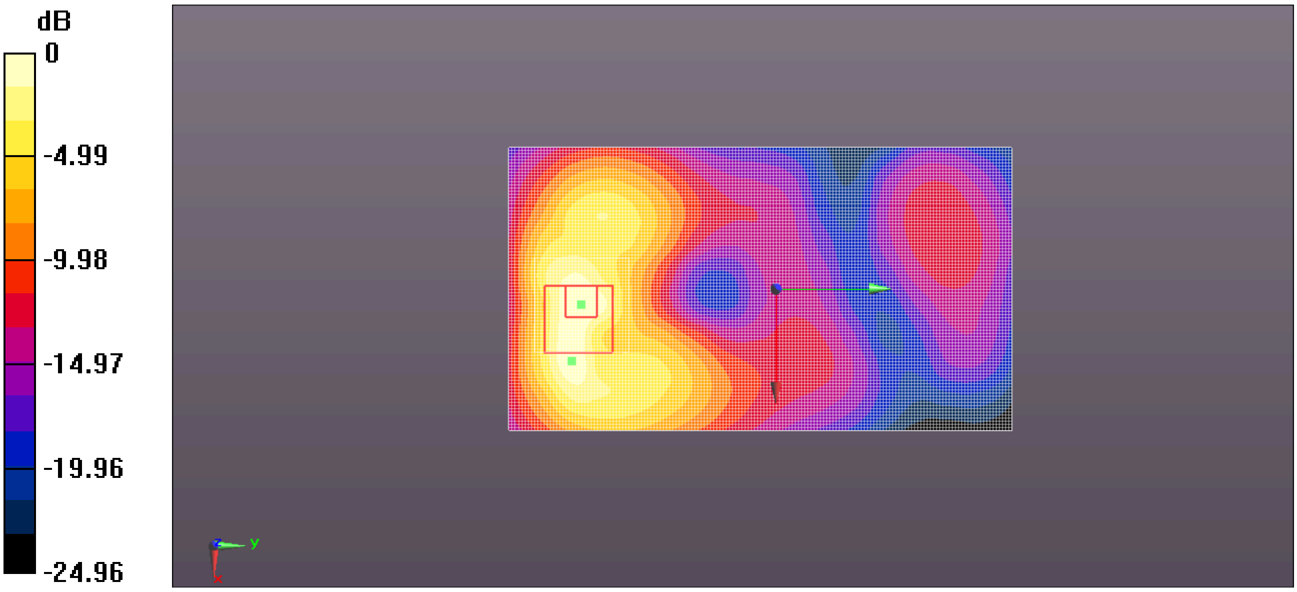

0 dB = 0.724 W/kg = -1.40 dBW/kg

| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; σ = 2.135 S/m; $\varepsilon_r$ = 51.45; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/towards ground mid/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.45 W/kg
**body/towards ground mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.649 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 2.00 W/kg
**SAR(1 g) = 0.922 W/kg; SAR(10 g) = 0.424 W/kg**
Maximum value of SAR (measured) = 1.54 W/kg



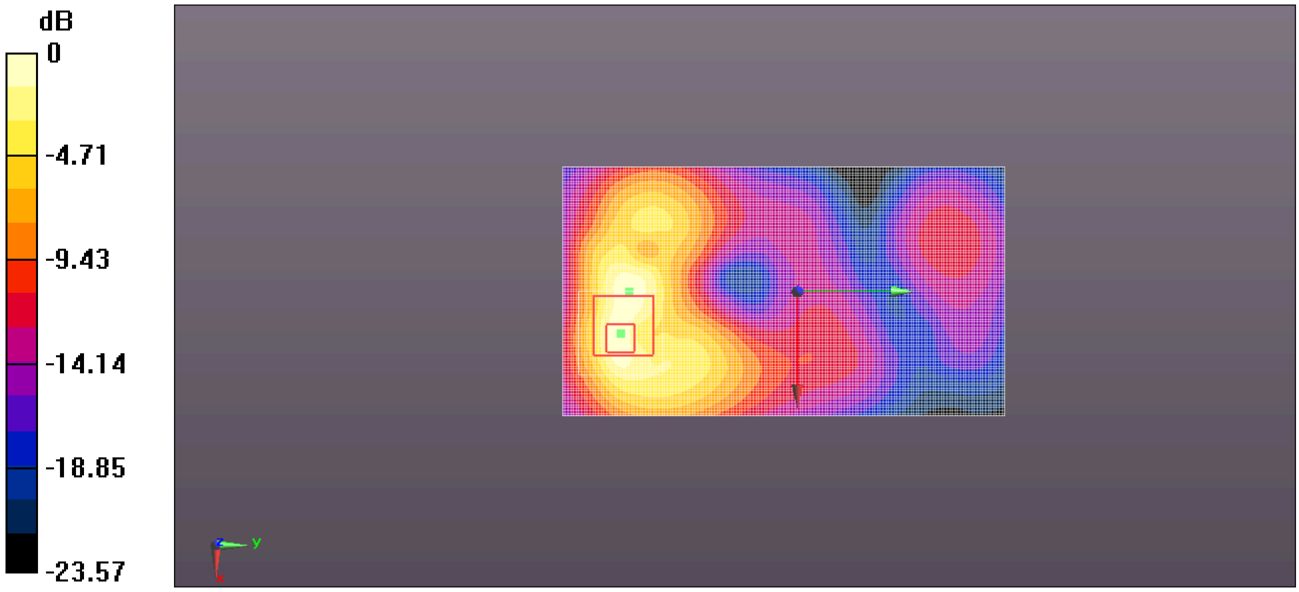

0 dB = 1.45 W/kg = 1.62 dBW/kg

| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 2.135 S/m; $\varepsilon_r$ = 51.45; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/towards ground mid spot check/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.42 W/kg
**body/towards ground mid spot check/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.101 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.76 W/kg
**SAR(1 g) = 0.873 W/kg; SAR(10 g) = 0.410 W/kg**
Maximum value of SAR (measured) = 1.42 W/kg



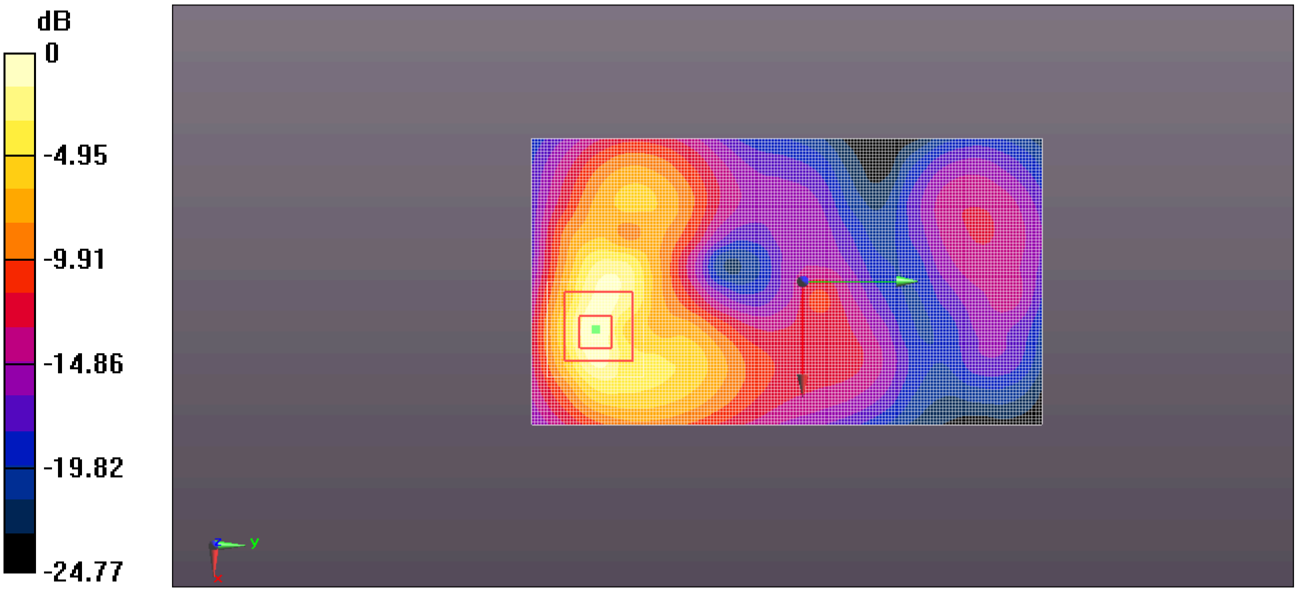

0 dB = 1.42 W/kg = 1.53 dBW/kg

| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2510 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2510 MHz; $\sigma = 2.095$ S/m; $\varepsilon_r = 51.424$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**body/towards ground low/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.93 W/kg
**body/towards ground low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.237 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 2.28 W/kg
**SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.520 W/kg**
Maximum value of SAR (measured) = 1.87 W/kg




0 dB = 1.93 W/kg = 2.86 dBW/kg

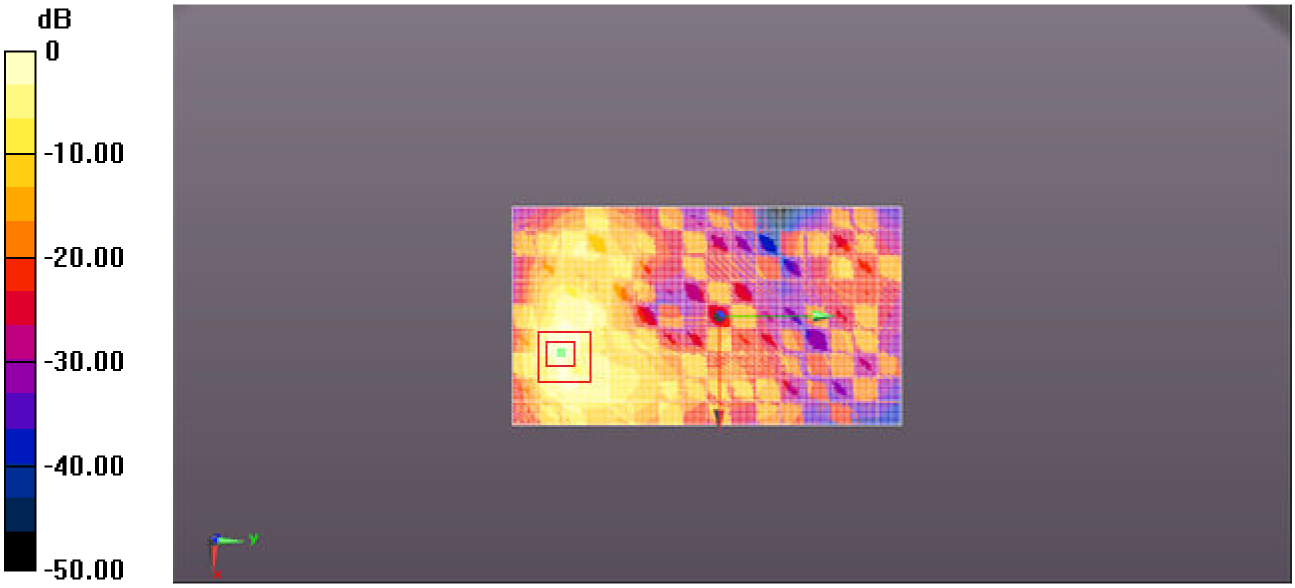
| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2510 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2510 MHz; $\sigma$ = 2.095 S/m; $\varepsilon_r$ = 51.424; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **body/towards ground low spot check/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 1.91 W/kg
  **body/towards ground low spot check/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

- Reference Value = 5.142 V/m; Power Drift = 0.01 dB
  Peak SAR (extrapolated) = 2.071 W/kg
  **SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.475 W/kg**
  Maximum value of SAR (measured) = 1.91 W/kg



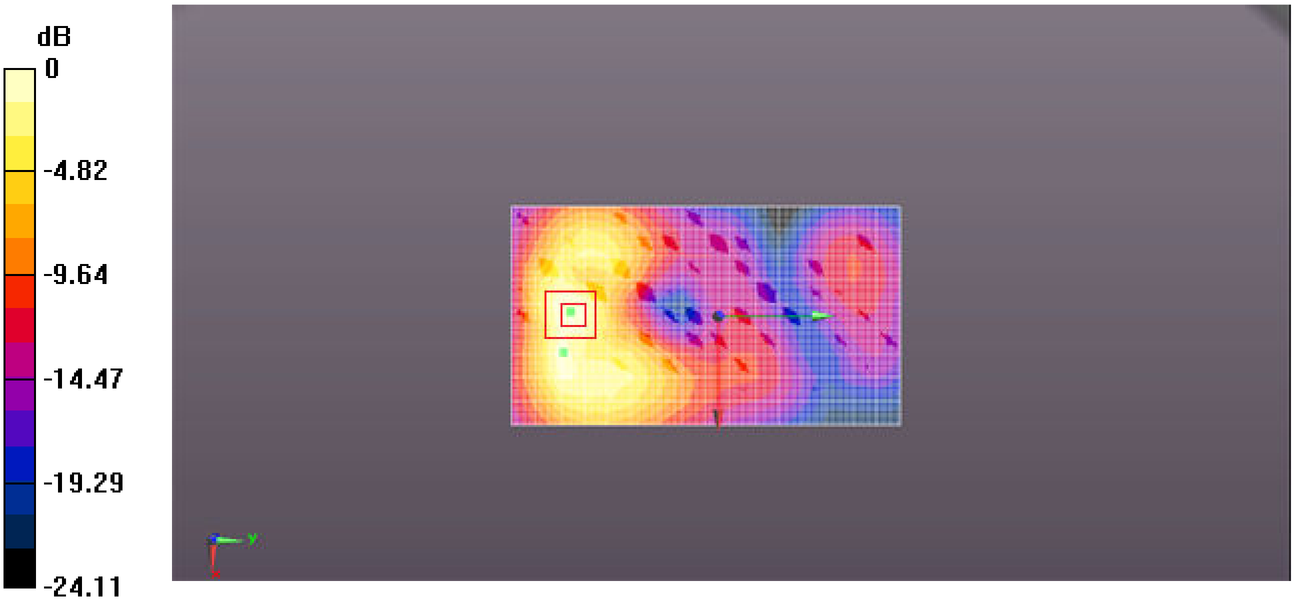

0 dB = 1.91 W/kg = 2.81 dBW/kg

| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2560 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2560 MHz; $\sigma$ = 2.142 S/m; $\varepsilon_r$ = 51.52; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.86, 6.86, 6.86); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **body/towards ground high/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 1.26 W/kg
  **body/towards ground high/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

- Reference Value = 4.733 V/m; Power Drift = -0.10 dB
  Peak SAR (extrapolated) = 1.142 W/kg
  **SAR(1 g) = 0.730 W/kg; SAR(10 g) = 0.341 W/kg**
  Maximum value of SAR (measured) = 1.09 W/kg

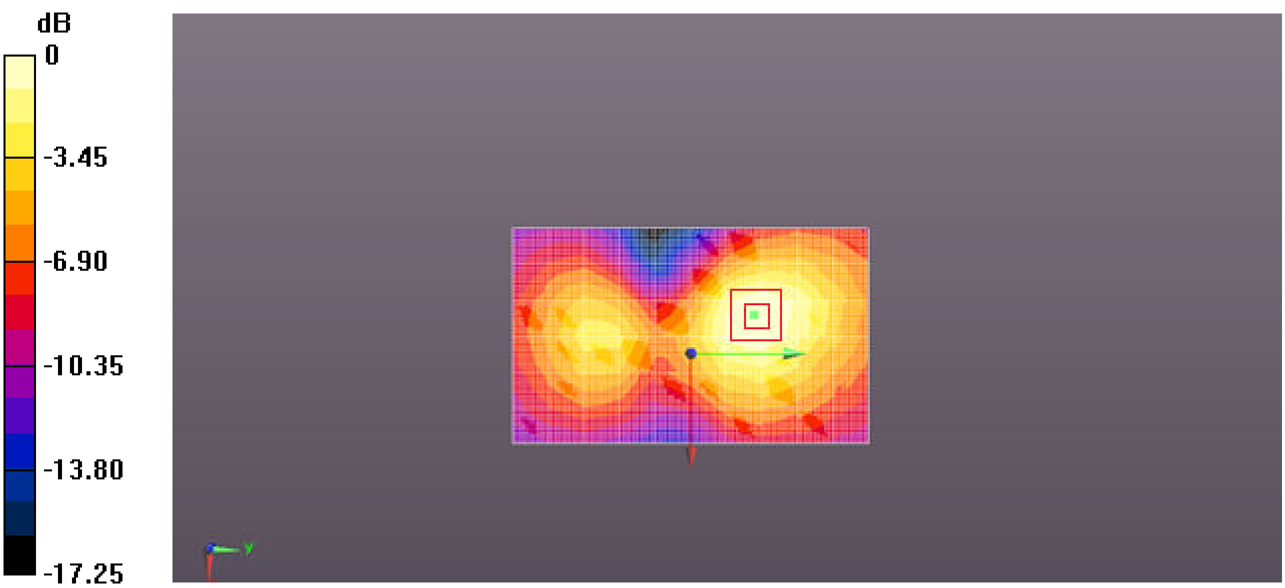



0 dB = 1.26 W/kg = 1.00 dBW/kg

| FLAT | EDGE2 |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 2.135 S/m; $\varepsilon_r$ = 51.45; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **body/edge 2 mid/Area Scan (61x101x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.660 W/kg
  **body/edge 2 mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 8.784 V/m; Power Drift = 0.19 dB
  Peak SAR (extrapolated) = 0.721 W/kg
  **SAR(1 g) = 0.415 W/kg; SAR(10 g) = 0.208 W/kg**
  Maximum value of SAR (measured) = 0.582 W/kg



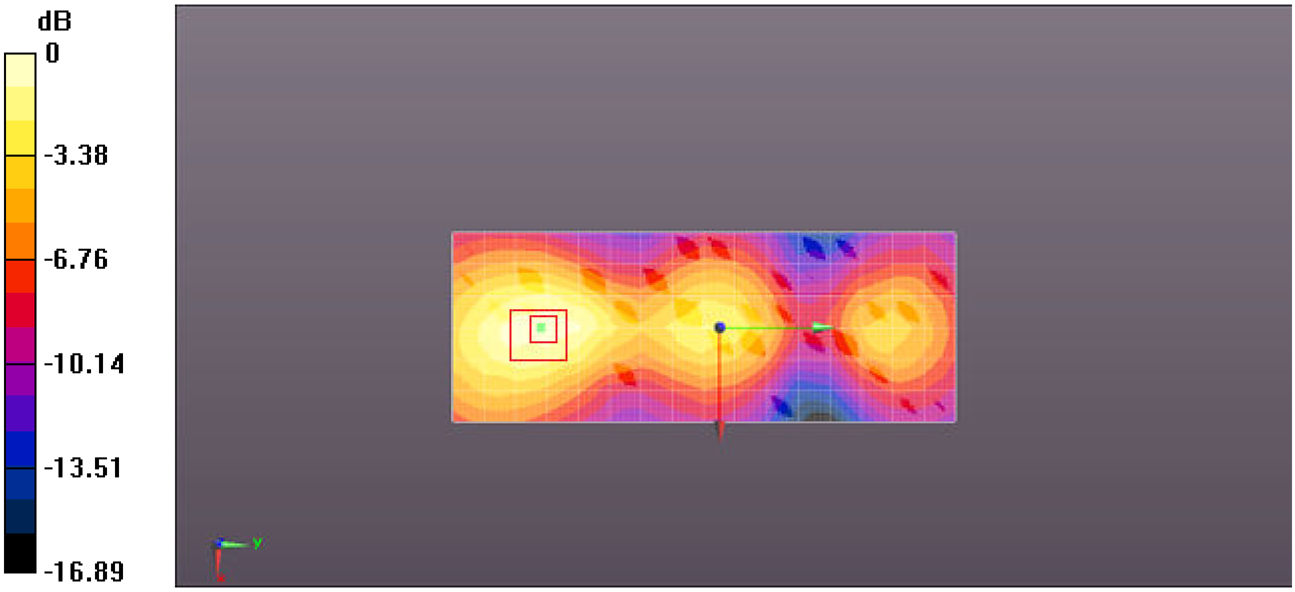

0 dB = 0.660 W/kg = -1.80 dBW/kg

| FLAT | EDGE3 |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma = 2.135$ S/m; $\varepsilon_r = 51.45$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **body2/edge3 mid/Area Scan (61x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.231 W/kg
  **body2/edge3 mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 7.499 V/m; Power Drift = -0.05 dB
  Peak SAR (extrapolated) = 0.421 W/kg
  **SAR(1 g) = 0.148 W/kg; SAR(10 g) = 0.0764 W/kg**
  Maximum value of SAR (measured) = 0.228 W/kg

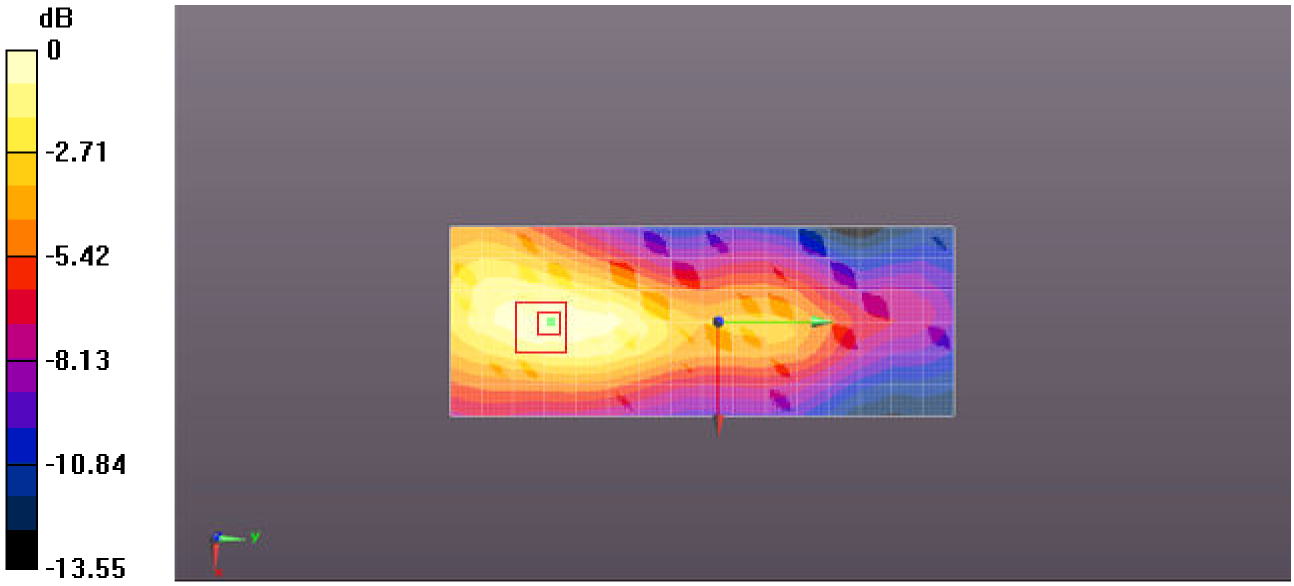



0 dB = 0.231 W/kg = -6.37 dBW/kg

| FLAT | EDGE4 |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_1RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 2.135 S/m; $\varepsilon_r$ = 51.45; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **body2/edge4 mid/Area Scan (61x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.317 W/kg
  **body2/edge4 mid/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 7.537 V/m; Power Drift = 0.05 dB
  Peak SAR (extrapolated) = 0.521 W/kg
  **SAR(1 g) = 0.208 W/kg; SAR(10 g) = 0.113 W/kg**
  Maximum value of SAR (measured) = 0.317 W/kg




0 dB = 0.317 W/kg = -4.99 dBW/kg

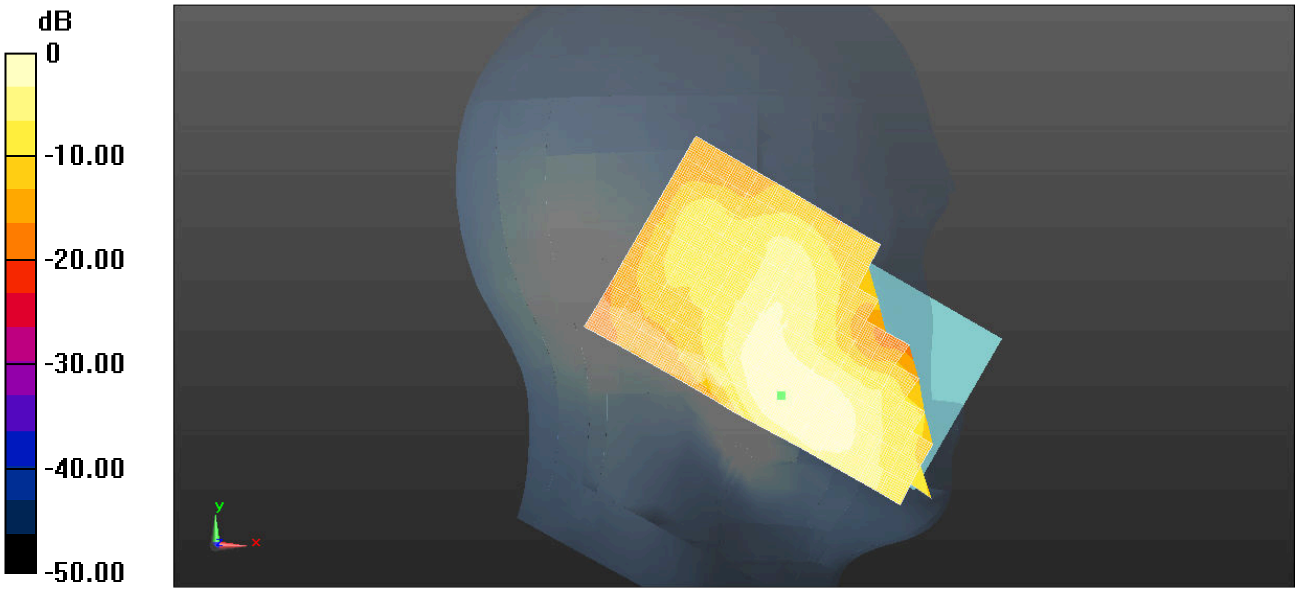
**LTE (Band 7 20BW-50%RB-Low /Head)**

| Left Side | Cheek |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_50RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **left/touch mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.276 W/kg
  **left/touch mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 3.480 V/m; Power Drift = -0.04 dB
  Peak SAR (extrapolated) = 0.322 W/kg
  **SAR(1 g) = 0.171 W/kg; SAR(10 g) = 0.0919 W/kg**
  Maximum value of SAR (measured) = 0.249 W/kg




0 dB = 0.276 W/kg = -5.59 dBW/kg

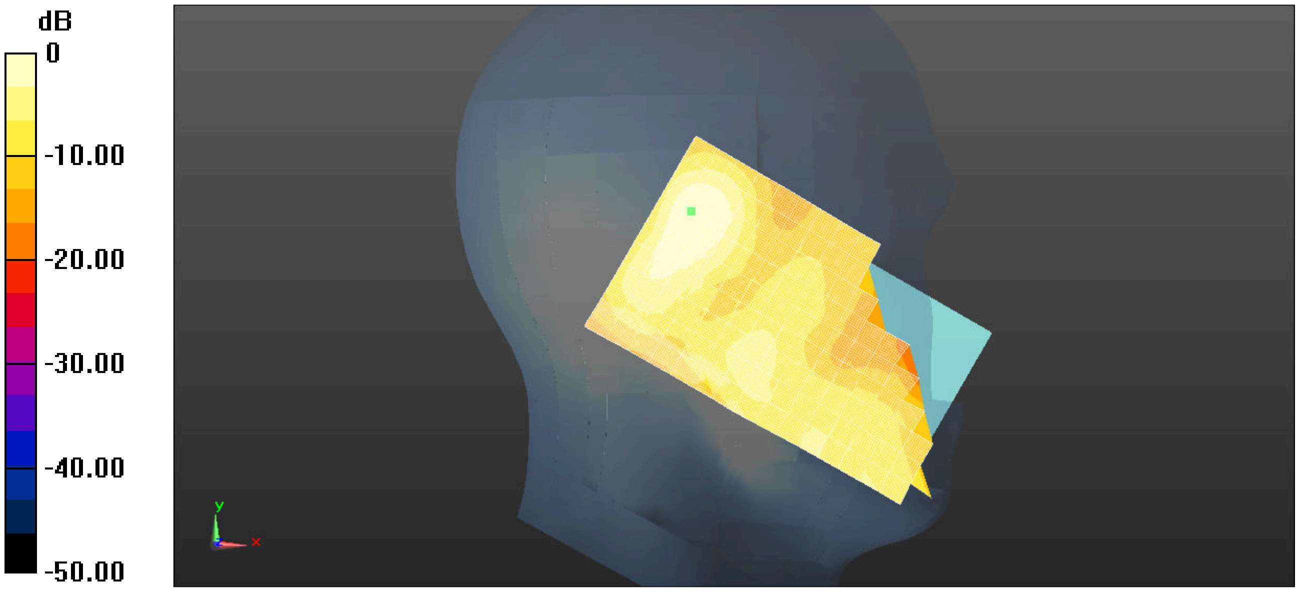
| Left Side | Tilt |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_50RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$

Phantom section: Left Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **left/tilt mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.143 W/kg
  **left/tilt mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 7.480 V/m; Power Drift = -0.06 dB
  Peak SAR (extrapolated) = 0.263 W/kg
  **SAR(1 g) = 0.0826 W/kg; SAR(10 g) = 0.0416 W/kg**
  Maximum value of SAR (measured) = 0.122 W/kg

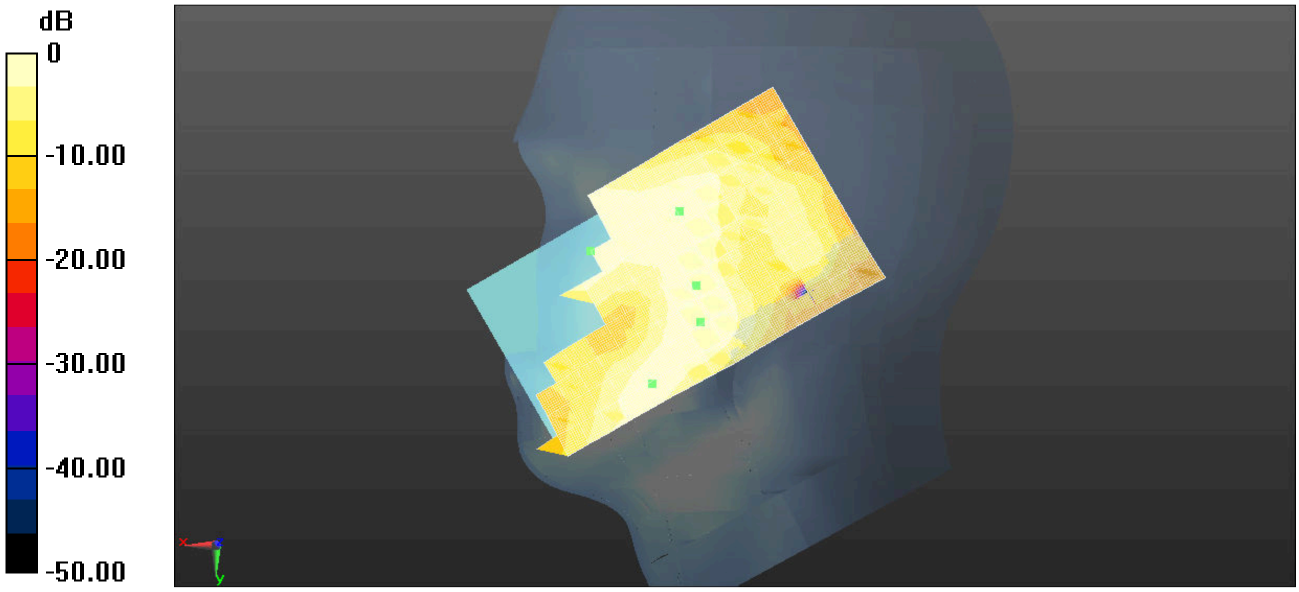



0 dB = 0.143 W/kg = -8.43 dBW/kg

| Right Side | Cheek |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_50RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **right/touch mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.115 W/kg
  **right/touch mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 3.808 V/m; Power Drift = 0.05 dB
  Peak SAR (extrapolated) = 0.181 W/kg
  **SAR(1 g) = 0.0736 W/kg; SAR(10 g) = 0.0393 W/kg**
  Maximum value of SAR (measured) = 0.108 W/kg



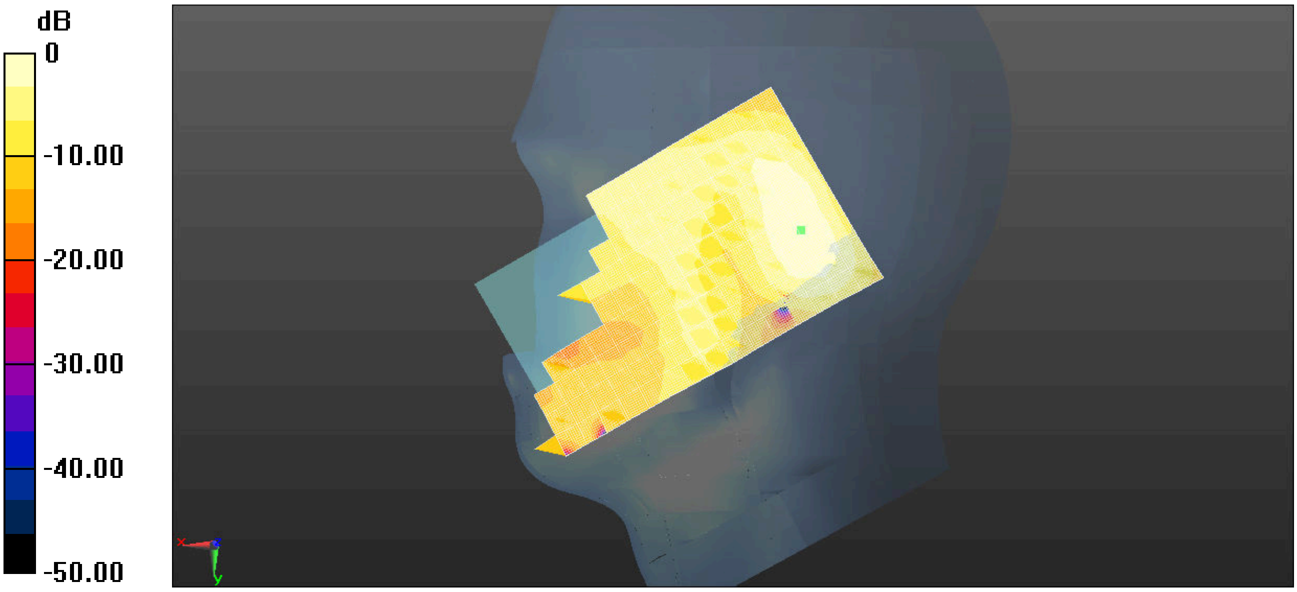

0 dB = 0.115 W/kg = -9.40 dBW/kg

| Right Side | Tilt |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_50RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 1.961 S/m; $\varepsilon_r$ = 39.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(6.96, 6.96, 6.96); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **right/tilt mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.0965 W/kg
  **right/tilt mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 6.334 V/m; Power Drift = 0.01 dB
  Peak SAR (extrapolated) = 0.131 W/kg
  **SAR(1 g) = 0.0621 W/kg; SAR(10 g) = 0.0325 W/kg**
  Maximum value of SAR (measured) = 0.0959 W/kg



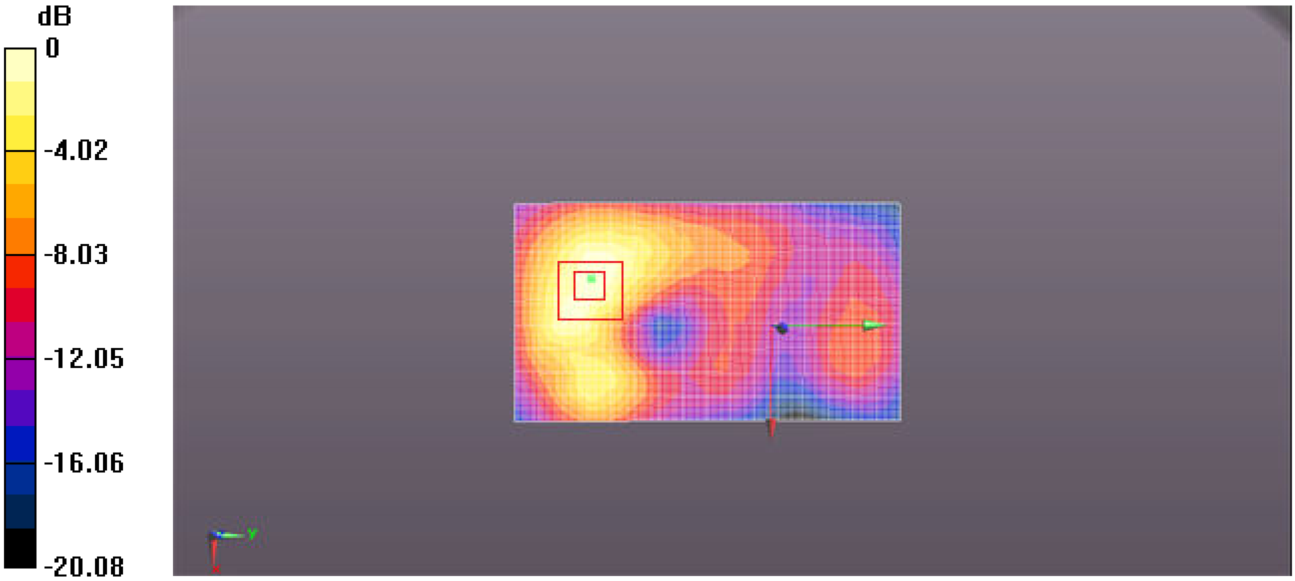

0 dB = 0.0965 W/kg = -10.16 dBW/kg

**LTE (Band 5 10BW-50%RB-Low/Flat)**

| FLAT | Towards phantom |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_50RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 2.135 S/m; $\varepsilon_r$ = 51.45; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)
  **body/towards phantom mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 0.546 W/kg
  **body/towards phantom mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 4.929 V/m; Power Drift = -0.12 dB
  Peak SAR (extrapolated) = 0.679 W/kg
  **SAR(1 g) = 0.352 W/kg; SAR(10 g) = 0.184 W/kg**
  Maximum value of SAR (measured) = 0.538 W/kg



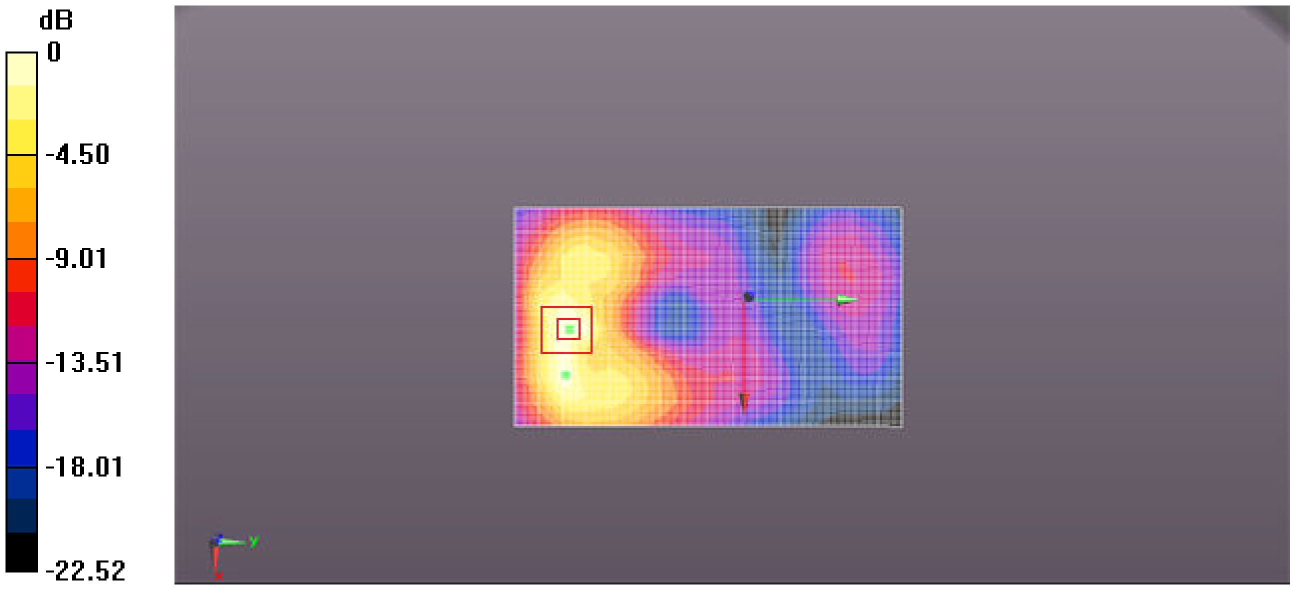

0 dB = 0.546 W/kg = -2.62 dBW/kg

| FLAT | Towards ground |
|---|---|

Communication System: UID 0, FDD-LTE(QPSK_20M_50RB) (0); Communication System Band: BAND 7; Frequency: 2535 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2535 MHz; $\sigma$ = 2.135 S/m; $\varepsilon_r$ = 51.45; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE1528-2013)
DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.04, 7.04, 7.04); Calibrated: 19/10/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 15/04/2016
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

  **body/towards ground mid 50%RB/Area Scan (91x161x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
  Maximum value of SAR (interpolated) = 1.11 W/kg
  **body/towards ground mid 50%RB/ Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
- Reference Value = 3.923 V/m; Power Drift = 0.02 dB
  Peak SAR (extrapolated) = 1.152 W/kg
  **SAR(1 g) = 0.674 W/kg; SAR(10 g) = 0.309 W/kg**
  Maximum value of SAR (measured) = 1.04 W/kg




0 dB = 1.11 W/kg = 0.47 dBW/kg

# ANNEX B - RELEVANT PAGES FROM CALIBRATION REPORTS

## DAE4 Sn:1226

In Collaboration with
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CALIBRATION
No. L0570

Client : Tejet Certificate No: Z16-97168

### CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | DAE4 - SN: 1226 |
| Calibration Procedure(s) | FD-Z11-002-01<br>Calibration Procedure for the Data Acquisition Electronics (DAEx) |
| Calibration date: | September 28, 2016 |

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Process Calibrator 753 | 1971018 | 27-June-16 (CTTL, No:J16X04778) | June-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Lu Bingsong | Deputy Director of the laboratory | |

Issued: September 29, 2013

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Certificate No: Z16-97168 Page 1 of 3

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**Glossary:**

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

**Methods Applied and Interpretation of Parameters:**

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

Certificate No: Z16-97168 Page 2 of 3

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**DC Voltage Measurement**

A/D - Converter Resolution nominal
High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.......+3mV
DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---|---|---|---|
| High Range | 404.633 ± 0.15% (k=2) | 404.399 ± 0.15% (k=2) | 404.123 ± 0.15% (k=2) |
| Low Range | 3.97867 ± 0.7% (k=2) | 4.00359 ± 0.7% (k=2) | 3.98540 ± 0.7% (k=2) |

**Connector Angle**

| | |
|---|---|
| Connector Angle to be used in DASY system | 114° ± 1 ° |

Certificate No: Z16-97168 Page 3 of 3

# DAE4 Sn:1327

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CALIBRATION No. L0570

Client : Tejet Certificate No: J16-97048

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | DAE4 - SN: 1327 |
| Calibration Procedure(s) | FD-Z11-2-002-01<br>Calibration Procedure for the Data Acquisition Electronics (DAEx) |
| Calibration date: | April 15, 2016 |

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Process Calibrator 753 | 1971018 | 01-July-14 (CTTL, No:J14X02147) | July-15 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Lu Bingsong | Deputy Director of the laboratory | |

Issued: April 18, 2016

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Certificate No: J16-97048 Page 1 of 3

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**Glossary:**

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

**Methods Applied and Interpretation of Parameters:**

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

Certificate No: J16-97048 Page 2 of 3

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**DC Voltage Measurement**

A/D - Converter Resolution nominal
High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.......+3mV
DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---|---|---|---|
| High Range | 404.880 ± 0.15% (k=2) | 404.737 ± 0.15% (k=2) | 404.934 ± 0.15% (k=2) |
| Low Range | 3.99344 ± 0.7% (k=2) | 3.99268 ± 0.7% (k=2) | 3.99828 ± 0.7% (k=2) |

**Connector Angle**

| | |
|---|---|
| Connector Angle to be used in DASY system | 188° ± 1 ° |

Certificate No: J16-97048 Page 3 of 3

# ES3DV3 Sn:3297

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Client: Tejet | Certificate No: Z16-97170

## CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3297

Calibration Procedure(s): FD-Z11-004-01
Calibration Procedures for Dosimetric E-field Probes

Calibration date: October 14, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101547 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101548 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Reference10dBAttenuator | 18N50W-10dB | 13-Mar-16(CTTL,No.J16X01547) | Mar-18 |
| Reference20dBAttenuator | 18N50W-20dB | 13-Mar-16(CTTL, No.J16X01548) | Mar-18 |
| Reference Probe EX3DV4 | SN 7307 | 19-Feb-16(SPEAG,No.EX3-7307_Feb16) | Feb-17 |
| DAE4 | SN 1331 | 21-Jan-16(SPEAG, No.DAE4-1331_Jan16) | Jan -17 |
| **Secondary Standards** | **ID #** | **Cal Date(Calibrated by, Certificate No.)** | **Scheduled Calibration** |
| SignalGeneratorMG3700A | 6201052605 | 27-Jun-16 (CTTL, No.J16X04776) | Jun-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan -17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Yu Zongying | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Liu Wei | Deputy Director of SEM Department | |

Issued: October 15, 2016





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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A,B,C,D | modulation dependent linearization parameters |
| Polarization Φ | Φ rotation around probe axis |
| Polarization θ | θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Methods Applied and Interpretation of Parameters:**

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the $E^2$-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).



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# Probe ES3DV3

## SN: 3297

Calibrated: October 14, 2016

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



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## DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3297

### Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm($\mu V/(V/m)^2$)[A] | 0.94 | 1.03 | 1.26 | ±10.8% |
| DCP(mV)[B] | 103.8 | 103.8 | 102.4 | |

### Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB√μV | C | D dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 230.2 | ±2.8% |
| | | Y | 0.0 | 0.0 | 1.0 | | 242.0 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 271.4 | |

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the $E^2$-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# ES3DV3 Sn:3297

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## DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3297

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz][C] | Relative Permittivity[F] | Conductivity (S/m)[F] | ConvF X | ConvF Y | ConvF Z | Alpha[G] | Depth[G] (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 835 | 41.5 | 0.90 | 6.18 | 6.18 | 6.18 | 0.43 | 1.45 | ±12% |
| 900 | 41.5 | 0.97 | 6.21 | 6.21 | 6.21 | 0.40 | 1.55 | ±12% |
| 1750 | 40.1 | 1.37 | 5.22 | 5.22 | 5.22 | 0.56 | 1.49 | ±12% |
| 1900 | 40.0 | 1.40 | 5.09 | 5.09 | 5.09 | 0.60 | 1.44 | ±12% |
| 2000 | 40.0 | 1.40 | 4.93 | 4.93 | 4.93 | 0.45 | 1.77 | ±12% |
| 2450 | 39.2 | 1.80 | 4.53 | 4.53 | 4.53 | 0.83 | 1.26 | ±12% |

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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## DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3297

### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz][C] | Relative Permittivity[F] | Conductivity (S/m)[F] | ConvF X | ConvF Y | ConvF Z | Alpha[G] | Depth[G] (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 835 | 55.2 | 0.97 | 6.08 | 6.08 | 6.08 | 0.43 | 1.56 | ±12% |
| 900 | 55.0 | 1.05 | 6.08 | 6.08 | 6.08 | 0.42 | 1.64 | ±12% |
| 1750 | 53.4 | 1.49 | 4.99 | 4.99 | 4.99 | 0.56 | 1.59 | ±12% |
| 1900 | 53.3 | 1.52 | 4.82 | 4.82 | 4.82 | 0.52 | 1.62 | ±12% |
| 2000 | 53.3 | 1.52 | 4.65 | 4.65 | 4.65 | 0.44 | 2.03 | ±12% |
| 2450 | 52.7 | 1.95 | 4.46 | 4.46 | 4.46 | 0.90 | 1.25 | ±12% |

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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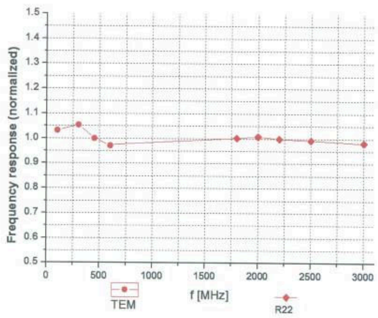
## Frequency Response of E-Field

(TEM-Cell: ifi110 EXX, Waveguide: R22)




Uncertainty of Frequency Response of E-field: ±7.5% (k=2)



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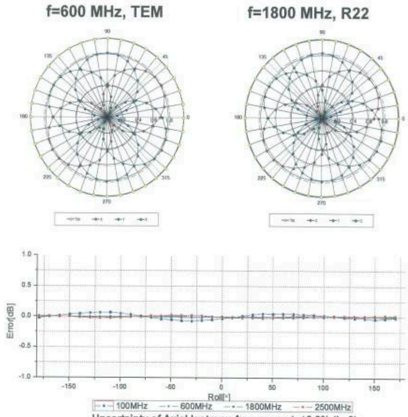
## Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM f=1800 MHz, R22




Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

## ES3DV3 Sn:3297

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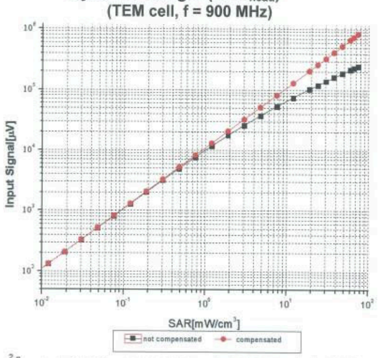
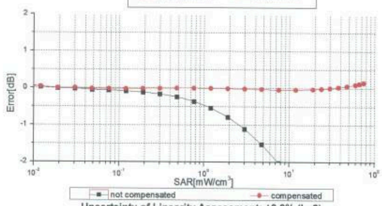
### Dynamic Range f($SAR_{head}$)
(TEM cell, f = 900 MHz)




Uncertainty of Linearity Assessment: ±0.9% (k=2)



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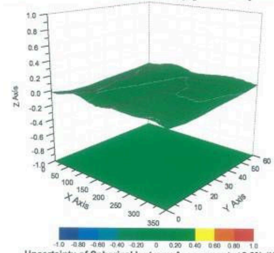
### Conversion Factor Assessment


### Deviation from Isotropy in Liquid




Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)



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### DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3297

**Other Probe Parameters**

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 15.5 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disable |
| Probe Overall Length | 337mm |
| Probe Body Diameter | 10mm |
| Tip Length | 10mm |
| Tip Diameter | 4mm |
| Probe Tip to Sensor X Calibration Point | 2mm |
| Probe Tip to Sensor Y Calibration Point | 2mm |
| Probe Tip to Sensor Z Calibration Point | 2mm |
| Recommended Measurement Distance from Surface | 3mm |

# EX3DV4 Sn:3717

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Client Tejet Certificate No: Z16-97169

## CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3717

Calibration Procedure(s): FD-Z11-004-01
Calibration Procedures for Dosimetric E-field Probes

Calibration date: October 19, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101547 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101548 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Reference10dBAttenuator | 18N50W-10dB | 13-Mar-16(CTTL,No.J16X01547) | Mar-18 |
| Reference20dBAttenuator | 18N50W-20dB | 13-Mar-16(CTTL, No.J16X01548) | Mar-18 |
| Reference Probe EX3DV4 | SN 7307 | 19-Feb-16(SPEAG,No.EX3-7307_Feb16) | Feb-17 |
| DAE4 | SN 1331 | 21-Jan-16(SPEAG, No.DAE4-1331_Jan16) | Jan -17 |
| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
| SignalGeneratorMG3700A | 6201052605 | 27-Jun-16 (CTTL, No.J16X04776) | Jun-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan -17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Yu Zongying | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Liu Wei | Deputy Director of SEM Department | |

Issued: October 21, 2016

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Certificate No: Z16-97169 Page 1 of 11

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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A,B,C,D | modulation dependent linearization parameters |
| Polarization Φ | Φ rotation around probe axis |
| Polarization θ | θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Methods Applied and Interpretation of Parameters:**

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the $E^2$-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Certificate No: Z16-97169 Page 2 of 11

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# Probe EX3DV4

## SN: 3717

Calibrated: October 19, 2016

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: Z16-97169 Page 3 of 11

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## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3717

### Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm(μV/(V/m)$^2$)[A] | 0.50 | 0.46 | 0.55 | ±10.8% |
| DCP(mV)[B] | 99.6 | 102.5 | 100.8 | |

### Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB√μV | C | D dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 203.0 | ±2.2% |
| | | Y | 0.0 | 0.0 | 1.0 | | 197.5 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 219.8 | |

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the $E^2$-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: Z16-97169 Page 4 of 11

EX3DV4 Sn:3717

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## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3717

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz][C] | Relative Permittivity[F] | Conductivity (S/m)[F] | ConvF X | ConvF Y | ConvF Z | Alpha[G] | Depth[G] (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 41.9 | 0.89 | 9.27 | 9.27 | 9.27 | 0.30 | 0.80 | ±12% |
| 835 | 41.5 | 0.90 | 8.93 | 8.93 | 8.93 | 0.14 | 1.39 | ±12% |
| 900 | 41.5 | 0.97 | 8.94 | 8.94 | 8.94 | 0.12 | 1.60 | ±12% |
| 1750 | 40.1 | 1.37 | 7.70 | 7.70 | 7.70 | 0.17 | 1.61 | ±12% |
| 1900 | 40.0 | 1.40 | 7.65 | 7.65 | 7.65 | 0.20 | 1.49 | ±12% |
| 2300 | 39.5 | 1.67 | 7.15 | 7.15 | 7.15 | 0.56 | 0.70 | ±12% |
| 2450 | 39.2 | 1.80 | 6.96 | 6.96 | 6.96 | 0.40 | 0.91 | ±12% |
| 2600 | 39.0 | 1.96 | 6.70 | 6.70 | 6.70 | 0.52 | 0.80 | ±12% |
| 5200 | 36.0 | 4.66 | 5.25 | 5.25 | 5.25 | 0.40 | 1.25 | ±13% |
| 5300 | 35.9 | 4.76 | 4.98 | 4.98 | 4.98 | 0.40 | 1.25 | ±13% |
| 5500 | 35.6 | 4.96 | 4.80 | 4.80 | 4.80 | 0.40 | 1.28 | ±13% |
| 5600 | 35.5 | 5.07 | 4.67 | 4.67 | 4.67 | 0.40 | 1.45 | ±13% |
| 5800 | 35.3 | 5.27 | 4.57 | 4.57 | 4.57 | 0.44 | 1.45 | ±13% |

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3717

### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz][C] | Relative Permittivity[F] | Conductivity (S/m)[F] | ConvF X | ConvF Y | ConvF Z | Alpha[G] | Depth[G] (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 55.5 | 0.96 | 9.25 | 9.25 | 9.25 | 0.50 | 0.82 | ±12% |
| 835 | 55.2 | 0.97 | 8.99 | 8.99 | 8.99 | 0.16 | 1.54 | ±12% |
| 900 | 55.0 | 1.05 | 8.93 | 8.93 | 8.93 | 0.23 | 1.12 | ±12% |
| 1750 | 53.4 | 1.49 | 7.63 | 7.63 | 7.63 | 0.17 | 1.79 | ±12% |
| 1900 | 53.3 | 1.52 | 7.44 | 7.44 | 7.44 | 0.20 | 1.71 | ±12% |
| 2300 | 52.9 | 1.81 | 7.06 | 7.06 | 7.06 | 0.55 | 0.79 | ±12% |
| 2450 | 52.7 | 1.95 | 7.04 | 7.04 | 7.04 | 0.38 | 1.12 | ±12% |
| 2600 | 52.5 | 2.16 | 6.86 | 6.86 | 6.86 | 0.37 | 1.11 | ±12% |
| 5200 | 49.0 | 5.30 | 4.47 | 4.47 | 4.47 | 0.45 | 1.50 | ±13% |
| 5300 | 48.9 | 5.42 | 4.19 | 4.19 | 4.19 | 0.45 | 1.55 | ±13% |
| 5500 | 48.6 | 5.65 | 3.90 | 3.90 | 3.90 | 0.50 | 1.50 | ±13% |
| 5600 | 48.5 | 5.77 | 3.68 | 3.68 | 3.68 | 0.50 | 1.55 | ±13% |
| 5800 | 48.2 | 6.00 | 3.83 | 3.83 | 3.83 | 0.50 | 1.70 | ±13% |

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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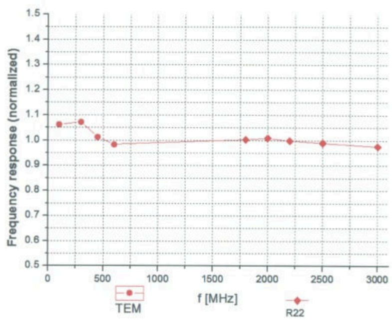
## Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)




Uncertainty of Frequency Response of E-field: ±7.5% (k=2)



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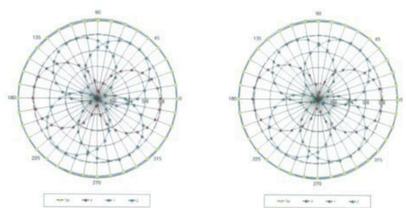
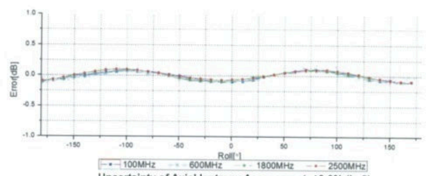
## Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM f=1800 MHz, R22






Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

EX3DV4 Sn:3717

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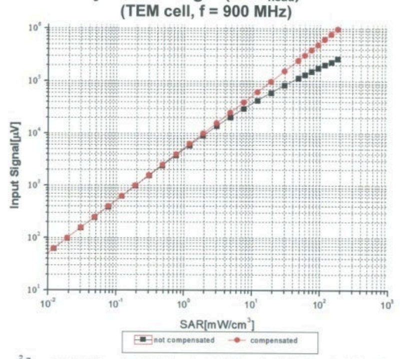
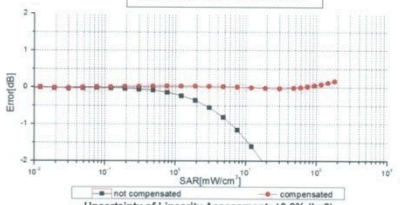
## Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)




Uncertainty of Linearity Assessment: ±0.9% (k=2)



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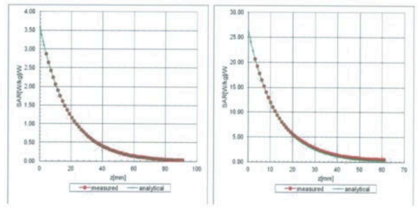
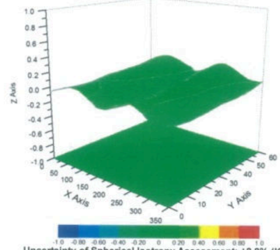
## Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF) f=1750 MHz, WGLS R22(H_convF)




## Deviation from Isotropy in Liquid




Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)



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## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3717

### Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 158.3 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disable |
| Probe Overall Length | 337mm |
| Probe Body Diameter | 10mm |
| Tip Length | 9mm |
| Tip Diameter | 2.5mm |
| Probe Tip to Sensor X Calibration Point | 1mm |
| Probe Tip to Sensor Y Calibration Point | 1mm |
| Probe Tip to Sensor Z Calibration Point | 1mm |
| Recommended Measurement Distance from Surface | 1.4mm |

# D835V2 Sn:4d100

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Client: Tejet — Certificate No: Z16-97171

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D835V2 - SN: 4d100 |
| Calibration Procedure(s) | FD-Z11-003-01<br>Calibration Procedures for dipole validation kits |
| Calibration date: | October 10, 2016 |

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101547 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Reference Probe ES3DV3 | SN 3149 | 15-Apr-16(CTTL-SPEAG,No.J16-97035) | Apr-17 |
| DAE4 | SN 777 | 22-Aug-16(CTTL-SPEAG,No.Z16-97138) | Aug-17 |
| **Secondary Standards** | **ID #** | **Cal Date(Calibrated by, Certificate No.)** | **Scheduled Calibration** |
| Signal Generator E4438C | MY49071430 | 01-Feb-16 (CTTL, No.J16X00893) | Jan-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Liu Wei | Deputy Director of SEM Department | |

Issued: October 14, 2016

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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORMx,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

Certificate No: Z16-97171 Page 2 of 8

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**Measurement Conditions**

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| DASY Version | DASY52 | 52.8.8.1258 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Triple Flat Phantom 5.1C | |
| Distance Dipole Center - TSL | 15 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 835 MHz ± 1 MHz | |

**Head TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| Nominal Head TSL parameters | 22.0 °C | 41.5 | 0.90 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 41.3 ± 6 % | 0.89 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

**SAR result with Head TSL**

| SAR averaged over 1 $cm^3$ (1 g) of Head TSL | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.37 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.54 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 1.55 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.23 mW /g ± 20.4 % (k=2)** |

**Body TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| Nominal Body TSL parameters | 22.0 °C | 55.2 | 0.97 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 55.4 ± 6 % | 0.96 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- |

**SAR result with Body TSL**

| SAR averaged over 1 $cm^3$ (1 g) of Body TSL | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.39 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.61 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 1.59 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.39 mW /g ± 20.4 % (k=2)** |

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**Appendix**

**Antenna Parameters with Head TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 52.5Ω+ 1.37jΩ |
| Return Loss | - 31.2dB |

**Antenna Parameters with Body TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 47.5Ω- 1.58jΩ |
| Return Loss | - 30.5dB |

**General Antenna Parameters and Design**

| | |
|---|---|
| Electrical Delay (one direction) | 1.500 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

| | |
|---|---|
| Manufactured by | SPEAG |

Certificate No: Z16-97171 Page 4 of 8

# D835V2 Sn:4d100

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**DASY5 Validation Report for Head TSL** Date: 10.10.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d100**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma$ = 0.892 S/m; $\varepsilon_r$ = 41.33; $\rho$ = 1000 kg/m$^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.13, 6.13, 6.13); Calibrated: 4/15/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 2016-08-22
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

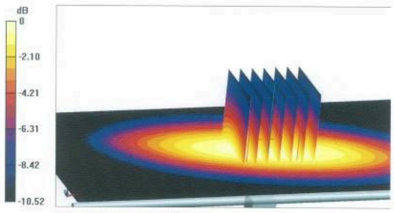
**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.12V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg**

Maximum value of SAR (measured) = 2.77 W/kg




0 dB = 2.77 W/kg = 4.42 dBW/kg



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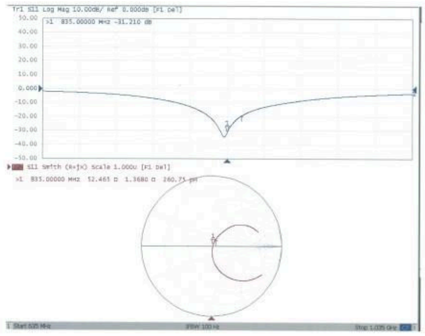
**Impedance Measurement Plot for Head TSL**



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**DASY5 Validation Report for Body TSL** Date: 10.10.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d100**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma$ = 0.964 S/m; $\varepsilon_r$ = 55.42; $\rho$ = 1000 kg/m$^3$

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.13,6.13, 6.13); Calibrated: 4/15/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 2016-08-22
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

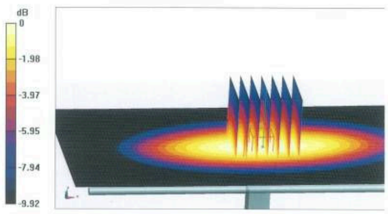
**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.07 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.46 W/kg

**SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.59 W/kg**

Maximum value of SAR (measured) = 2.78 W/kg




0 dB = 2.78 W/kg = 4.44 dBW/kg



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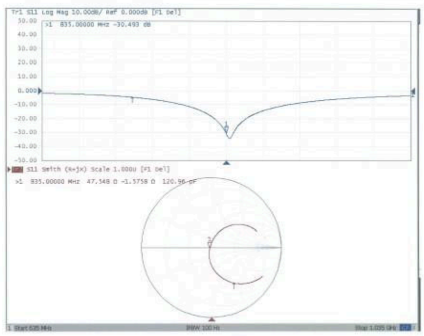
**Impedance Measurement Plot for Body TSL**



# D1750V2 Sn:1034

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Client Tejet Certificate No: Z16-97173

## CALIBRATION CERTIFICATE

Object: D1750V2 - SN: 1034

Calibration Procedure(s): FD-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: October 11, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101547 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Reference Probe ES3DV3 | SN 3149 | 15-Apr-16(CTTL-SPEAG,No.J16-97035) | Apr-17 |
| DAE4 | SN 777 | 22-Aug-16(CTTL-SPEAG,No.Z16-97138) | Aug-17 |

| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Signal Generator E4438C | MY49071430 | 01-Feb-16 (CTTL, No.J16X00893) | Jan-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Liu Wei | Deputy Director of SEM Department | |

Issued: October 14, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: Z16-97173 Page 1 of 8

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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORMx,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

Certificate No: Z16-97173 Page 2 of 8

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**Measurement Conditions**

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY52 | 52.8.8.1258 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Triple Flat Phantom 5.1C | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1750 MHz ± 1 MHz | |

**Head TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.1 | 1.37 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.2 ± 6 % | 1.39 mho/m ± 6 % |
| **Head TSL temperature change during test** | <1.0 °C | ---- | ---- |

**SAR result with Head TSL**

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.30 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **36.9 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 5.08 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **20.2 mW /g ± 20.4 % (k=2)** |

**Body TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.4 | 1.49 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.5 ± 6 % | 1.50 mho/m ± 6 % |
| **Body TSL temperature change during test** | <1.0 °C | ---- | ---- |

**SAR result with Body TSL**

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.32 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **37.1 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 5.15 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **20.5 mW /g ± 20.4 % (k=2)** |

Certificate No: Z16-97173 Page 3 of 8

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**Appendix**

**Antenna Parameters with Head TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 49.0Ω- 0.90jΩ |
| Return Loss | - 37.3dB |

**Antenna Parameters with Body TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 46.3Ω+ 0.26jΩ |
| Return Loss | - 28.3dB |

**General Antenna Parameters and Design**

| | |
|---|---|
| Electrical Delay (one direction) | 1.318 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

| | |
|---|---|
| Manufactured by | SPEAG |

Certificate No: Z16-97173 Page 4 of 8

## D1750V2 Sn:1034

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**DASY5 Validation Report for Head TSL** Date: 10.11.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1034**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; $\sigma$ = 1.392 S/m; $\varepsilon r$ = 40.23; $\rho$ = 1000 kg/m3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(5.19, 5.19, 5.19); Calibrated: 4/15/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 2016-08-22
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

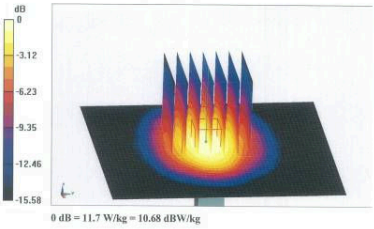
**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.35V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 16.1W/kg

**SAR(1 g) = 9.3 W/kg; SAR(10 g) = 5.08 W/kg**

Maximum value of SAR (measured) = 11.7 W/kg




**0 dB = 11.7 W/kg = 10.68 dBW/kg**



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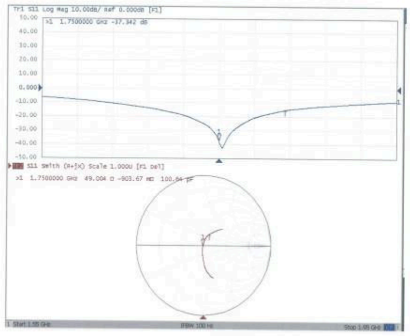
**Impedance Measurement Plot for Head TSL**





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**DASY5 Validation Report for Body TSL** Date: 10.11.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1034**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; $\sigma$ = 1.503 S/m; $\varepsilon_r$ = 53.51; $\rho$ = 1000 kg/m$^3$

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.95, 4.95, 4.95); Calibrated: 4/15/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 2016-08-22
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

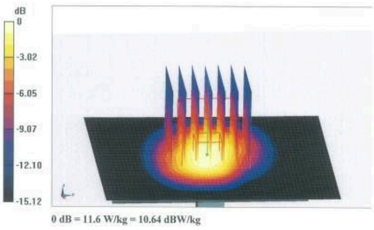
**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.04 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 15.4 W/kg

**SAR(1 g) = 9.32 W/kg; SAR(10 g) = 5.15 W/kg**

Maximum value of SAR (measured) = 11.6 W/kg




**0 dB = 11.6 W/kg = 10.64 dBW/kg**



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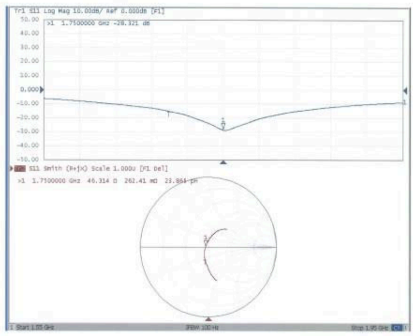
**Impedance Measurement Plot for Body TSL**



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# D1900V2 Sn:5d155

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Client: Tejet　　Certificate No: Z16-97050

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1900V2 - SN: 5d155 |
| Calibration Procedure(s) | FD-Z11-2-003-01<br>Calibration Procedures for dipole validation kits |
| Calibration date: | April 14, 2016 |

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 01-Jul-15 (CTTL, No.J15X04256) | Jun-16 |
| Power sensor NRP-Z91 | 101547 | 01-Jul-15 (CTTL, No.J15X04256) | Jun-16 |
| Reference Probe EX3DV4 | SN 3617 | 26-Aug-15(SPEAG,No.EX3-3617_Aug15) | Aug-16 |
| DAE4 | SN 1331 | 21-Jan-16(SPEAG,No.DAE4-1331_Jan16) | Jan-17 |
| **Secondary Standards** | **ID #** | **Cal Date(Calibrated by, Certificate No.)** | **Scheduled Calibration** |
| Signal Generator E4438C | MY49071430 | 01-Feb-16 (CTTL, No.J16X00893) | Jan-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | 赵静 |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | [illegible] |
| Approved by: | Lu Bingsong | Deputy Director of the laboratory | [illegible] |

Issued: April 18, 2016

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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORMx,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

Certificate No: Z16-97050　　Page 2 of 8

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**Measurement Conditions**

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY52 | 52.8.8.1258 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Triple Flat Phantom 5.1C | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

**Head TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.6 ± 6 % | 1.39 mho/m ± 6 % |
| **Head TSL temperature change during test** | <1.0 °C | ---- | ---- |

**SAR result with Head TSL**

| | | |
|---|---|---|
| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 10.2 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **41.0 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 5.31 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **21.3 mW /g ± 20.4 % (k=2)** |

**Body TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.2 ± 6 % | 1.50 mho/m ± 6 % |
| **Body TSL temperature change during test** | <1.0 °C | ---- | ---- |

**SAR result with Body TSL**

| | | |
|---|---|---|
| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 9.87 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **39.9 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 5.21 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.0 mW /g ± 20.4 % (k=2)** |

Certificate No: Z16-97050　　Page 3 of 8

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**Appendix**

**Antenna Parameters with Head TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 51.5Ω+ 6.24jΩ |
| Return Loss | - 24.0dB |

**Antenna Parameters with Body TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 49.6Ω+ 5.79jΩ |
| Return Loss | - 24.7dB |

**General Antenna Parameters and Design**

| | |
|---|---|
| Electrical Delay (one direction) | 1.310 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

| | |
|---|---|
| Manufactured by | SPEAG |

Certificate No: Z16-97050　　Page 4 of 8

# D1900V2 Sn:5d155

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**DASY5 Validation Report for Head TSL** Date: 04.14.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d155**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.386 S/m; εr = 39.58; ρ = 1000 kg/m3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.07, 8.07,8.07); Calibrated: 8/26/2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2016-01-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

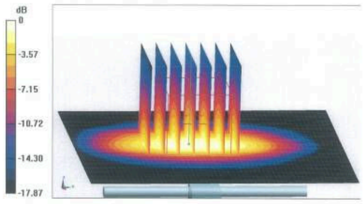
**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.1V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 19.1W/kg

**SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.31 W/kg**

Maximum value of SAR (measured) = 14.8 W/kg




**0 dB = 14.8 W/kg = 11.70 dBW/kg**



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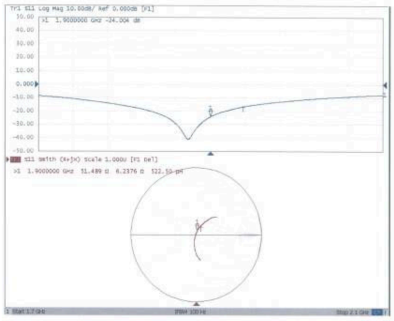
**Impedance Measurement Plot for Head TSL**





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**DASY5 Validation Report for Body TSL** Date: 04.14.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d155**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.501 S/m; $\varepsilon_r$ = 54.22; ρ = 1000 kg/m$^3$

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.74, 7.74,7.74); Calibrated: 8/26/2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2016-01-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

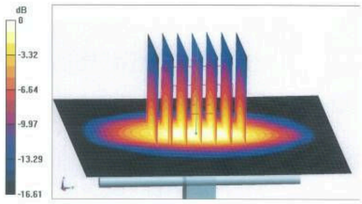
**System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.40 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.21 W/kg**

Maximum value of SAR (measured) = 14.0 W/kg




**0 dB = 14.0 W/kg = 11.46 dBW/kg**



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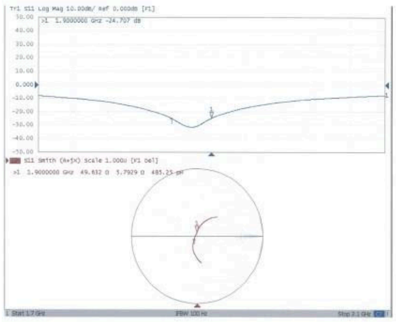
**Impedance Measurement Plot for Body TSL**



# D2450V2 Sn:845

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Client Tejet Certificate No: Z16-97175

## CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 845

Calibration Procedure(s): FD-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: October 12, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101547 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Reference Probe ES3DV3 | SN 3149 | 15-Apr-16(CTTL-SPEAG,No.J16-97035) | Apr-17 |
| DAE4 | SN 777 | 22-Aug-16(CTTL-SPEAG,No.Z16-97138) | Aug-17 |

| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Signal Generator E4438C | MY49071430 | 01-Feb-16 (CTTL, No.J16X00893) | Jan-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Liu Wei | Deputy Director of SEM Department | |

Issued: October 14, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: Z16-97175 Page 1 of 8

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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORMx,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

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**Measurement Conditions**

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| DASY Version | DASY52 | 52.8.8.1258 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Triple Flat Phantom 5.1C | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 2450 MHz ± 1 MHz | |

**Head TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 39.0 ± 6 % | 1.78 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

**SAR result with Head TSL**

| SAR averaged over 1 $cm^3$ (1 g) of Head TSL | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.0 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **52.3 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 6.09 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.4 mW /g ± 20.4 % (k=2)** |

**Body TSL parameters**

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| Nominal Body TSL parameters | 22.0 °C | 52.7 | 1.95 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 52.9 ± 6 % | 1.92 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- |

**SAR result with Body TSL**

| SAR averaged over 1 $cm^3$ (1 g) of Body TSL | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 12.7 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **51.2 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 5.99 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.1 mW /g ± 20.4 % (k=2)** |

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**Appendix**

**Antenna Parameters with Head TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 51.9Ω+ 4.93jΩ |
| Return Loss | - 25.7dB |

**Antenna Parameters with Body TSL**

| | |
|---|---|
| Impedance, transformed to feed point | 50.5Ω+ 6.56jΩ |
| Return Loss | - 23.7dB |

**General Antenna Parameters and Design**

| | |
|---|---|
| Electrical Delay (one direction) | 1.270 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

| | |
|---|---|
| Manufactured by | SPEAG |

## D2450V2 Sn:845

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**DASY5 Validation Report for Head TSL** Date: 10.12.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 845**

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.777 S/m; εr = 39.03; ρ = 1000 kg/m3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.51, 4.51, 4.51); Calibrated: 4/15/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 8/22/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

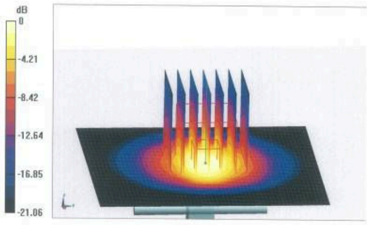
**Dipole Calibration**/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.63 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 26.7 W/kg

**SAR(1 g) = 13 W/kg; SAR(10 g) = 6.09 W/kg**

Maximum value of SAR (measured) = 17.1 W/kg




**0 dB = 17.1 W/kg = 12.33 dBW/kg**

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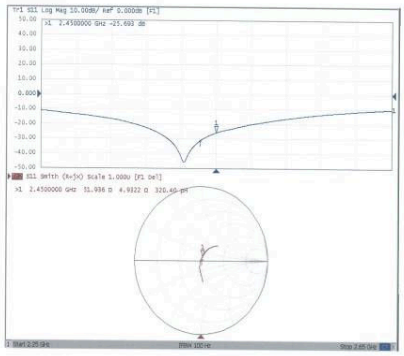
**Impedance Measurement Plot for Head TSL**



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**DASY5 Validation Report for Body TSL** Date: 10.12.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 845**

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.923 S/m; $\varepsilon_r$ = 52.91; ρ = 1000 kg/m$^3$

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.23, 4.23, 4.23); Calibrated: 4/15/2016;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 8/22/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

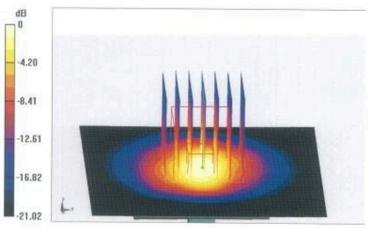
**Dipole Calibration**/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.85 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 24.8 W/kg

**SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.99 W/kg**

Maximum value of SAR (measured) = 16.7 W/kg




**0 dB = 16.7 W/kg = 12.23 dBW/kg**

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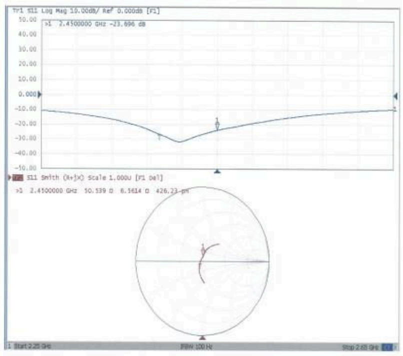
**Impedance Measurement Plot for Body TSL**



# D2600V2 Sn:1059

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Client: Tejet | Certificate No: Z16-97051

## CALIBRATION CERTIFICATE

Object: D2600V2 - SN: 1059

Calibration Procedure(s): FD-Z11-2-003-01
Calibration Procedures for dipole validation kits

Calibration date: April 14, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 01-Jul-15 (CTTL, No.J15X04256) | Jun-16 |
| Power sensor NRP-Z91 | 101547 | 01-Jul-15 (CTTL, No.J15X04256) | Jun-16 |
| Reference Probe EX3DV4 | SN 3617 | 26-Aug-15(SPEAG,No.EX3-3617_Aug15) | Aug-16 |
| DAE4 | SN 1331 | 21-Jan-16(SPEAG,No.DAE4-1331_Jan16) | Jan-17 |

| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Signal Generator E4438C | MY49071430 | 01-Feb-16 (CTTL, No.J16X00893) | Jan-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | 赵靖 |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Lu Bingsong | Deputy Director of the laboratory | 陆冰松 |

Issued: April 18, 2016

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Certificate No: Z16-97051 Page 1 of 8

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**Glossary:**

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORMx,y,z
N/A not applicable or not measured

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

Certificate No: Z16-97051 Page 2 of 8

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### Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| DASY Version | DASY52 | 52.8.8.1258 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Triple Flat Phantom 5.1C | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 2600 MHz ± 1 MHz | |

### Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| Nominal Head TSL parameters | 22.0 °C | 39.0 | 1.96 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 39.4 ± 6 % | 1.94 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

### SAR result with Head TSL

| | | |
|---|---|---|
| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 14.0 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **56.4 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 250 mW input power | 6.28 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **25.2 mW /g ± 20.4 % (k=2)** |

### Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| Nominal Body TSL parameters | 22.0 °C | 52.5 | 2.16 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 52.1 ± 6 % | 2.18 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- |

### SAR result with Body TSL

| | | |
|---|---|---|
| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 14.5 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **57.6 mW /g ± 20.8 % (k=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | Condition | |
| SAR measured | 250 mW input power | 6.52 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **26.0 mW /g ± 20.4 % (k=2)** |

Certificate No: Z16-97051 Page 3 of 8

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### Appendix

#### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.8Ω- 5.47jΩ |
| Return Loss | - 25.2dB |

#### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.9Ω- 3.75jΩ |
| Return Loss | - 27.2dB |

#### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.256 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

#### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |

Certificate No: Z16-97051 Page 4 of 8

# D2600V2 Sn:1059

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**DASY5 Validation Report for Head TSL** Date: 04.14.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1059**

Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; $\sigma$ = 1.938 S/m; $\varepsilon r$ = 39.38; $\rho$ = 1000 kg/m3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.21, 7.21,7.21); Calibrated: 8/26/2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2016-01-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

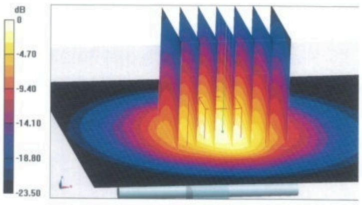
**Dipole Calibration**/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.7 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 29.9 W/kg

**SAR(1 g) = 14 W/kg; SAR(10 g) = 6.28 W/kg**

Maximum value of SAR (measured) = 21.7 W/kg




0 dB = 21.7 W/kg = 13.36 dBW/kg



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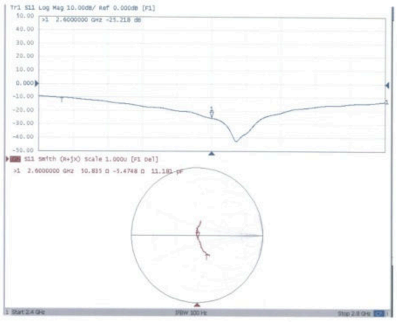
**Impedance Measurement Plot for Head TSL**



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**DASY5 Validation Report for Body TSL** Date: 04.14.2016

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1059**

Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; $\sigma$ = 2.184 S/m; $\varepsilon_r$ = 52.07; $\rho$ = 1000 kg/m$^3$

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.2, 7.2,7.2); Calibrated: 8/26/2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2016-01-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

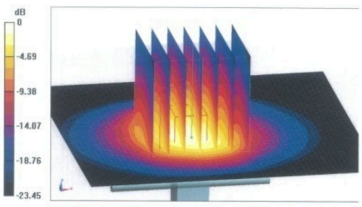
**Dipole Calibration**/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.85 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 30.7 W/kg

**SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.52 W/kg**

Maximum value of SAR (measured) = 22.2 W/kg




0 dB = 22.2 W/kg = 13.46 dBW/kg



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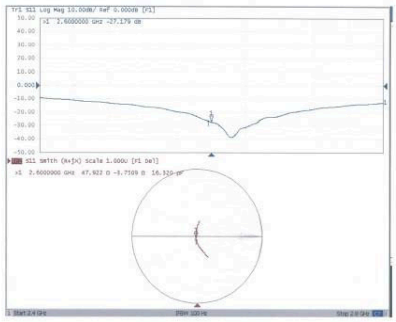
**Impedance Measurement Plot for Body TSL**







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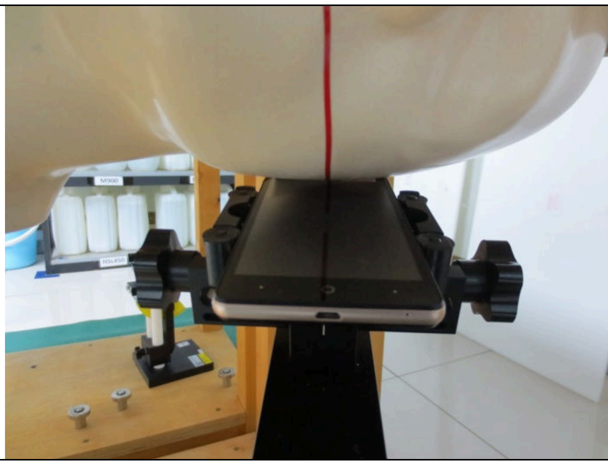
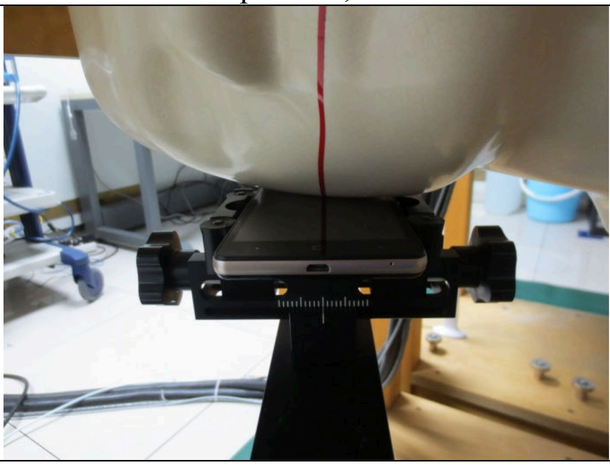
## ANNEX C - PHOTOGRAPH

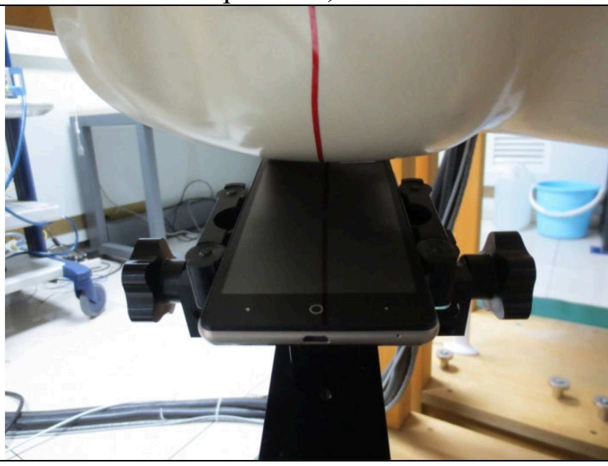
Cheek position, left side



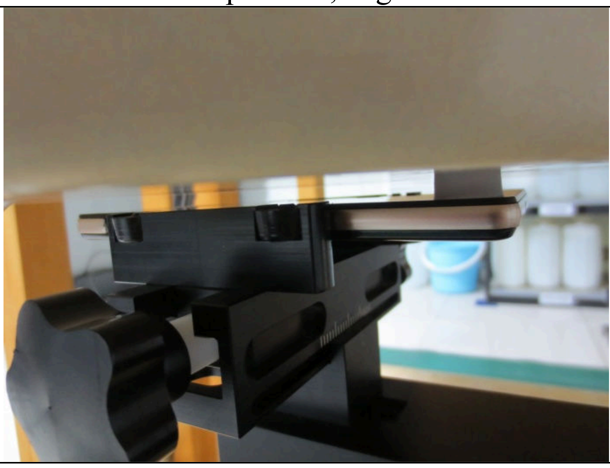
Tilt position, left side



Cheek position, Right side

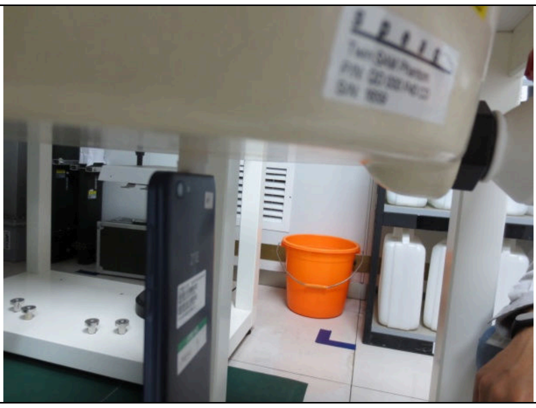


Tilt position, Right side



FLAT position, Towards phantom

FLAT position, Towards ground


FLAT position, EDGE1


FLAT position, EDGE2


FLAT position, EDGE3


FLAT position, EDGE4

10mm Spacer

---End of Test Report---